Self-Access in Goal Selection

Thesis

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Contents

Summary

Self-access in goal selection refers to processes that make self-related knowledge available while goals are being chosen. The ability to access the self is generally considered desirable because it allows people to choose goals that are in line with their underlying needs and implicit preferences. The present research addresses three main questions regarding self-access in goal selection. Firstly, it clarifies the relationship between different self-access models. A common feature of models of self-access in goal selection is that they conceptualize self-access in terms of a communication between two systems, one implicit and one explicit. Whether such a communication is possible depends on the availability of intuitive, affective, or experiential processing. Secondly, different strategies for measuring self-access are discussed. The measurement of self-access may be based on self-reports or on more objective criteria, where the latter may be classified as fit versus process measures. Process measures are considered the best measures of self-access in a narrow sense. Thirdly, several studies tested the prediction of self-access based on PSI theory (Kuhl, 2000). Self-access was hypothesized to become deficient in subjects with low action orientation who experienced negative affect. This prediction could not be confirmed by the present studies, neither using the self-infiltration paradigm (Kuhl & Kazén, 1994), nor using preference consistency as a measure of self-access. These unexpected results are explained by interfering memory processes as well as heterogeneity of self-access concepts. The main conclusion drawn from the present research is that focusing on theoretical distinctions allows a more fine-grained theoretical and empirical analysis of self-access phenomena.

Keywords: self-knowledge, self-access, goal selection, motivation, PSI theory, self-infiltration

Introduction

Members of individualistic societies (cf. Triandis & Gelfand, 2012) are encouraged to pursue their own goals based on a firm sense of identity. In other words, they are encouraged to derive their goals from what they know about themselves. This notion of the human being as an independent, self-reliant person is characteristic of humanistic psychology and has largely been ignored in other branches of psychological theory.

Rogers (1961), for instance, held that the troubles that clients of psychotherapy face are rooted in the underlying questions: "Who am I, *really*? How can I get in touch with my real self, . . . ? How can I become myself?" (p. 108; emphasis in original). Thus, according to Rogers, progress in psychotherapy is based on a process through which the patient moves away from—among other things—façades, from "oughts", from meeting expectations, from pleasing others (p. 167 ff.), towards "*being* . . . the process which he inwardly and actually *is*" (p. 175; emphasis in original). In other words, the patient learns to overcome obstacles and influences that keep him from being himself.

Humanistic psychologists have traditionally been sceptical about the application of the positivistic philosophy and the scientific method to the study of human behaviour and experience (e.g. Maslow, 1956). Rogers (1961, Chapter 10), a humanistic psychologist himself, however, opted for making use of science, in addition to the "experiential approach" (p. 210) he followed when working as a therapist. More recently, *empirical existential psychology* (Koole, Greenberg, & Pyszczynski, 2006) has emerged as an area of research that subjects ideas derived from existentialist—and the closely related humanistic—philosophy (see Sartre, 1970) to rigorous scientific testing. The present work is part of this tradition in that the question of how people can become themselves (Rogers, 1961) is researched using empirical methods.

In personality psychology, the task of selecting goals based on one's sense of self has

recently gained interest in research on *authenticity* (Kernis & Goldman, 2006; Maltby, Wood, Day, & Pinto, 2012). According to Wood, Linley, Maltby, Baliousis, and Joseph (2008), authenticity consists of, firstly, a person's awareness of his or her actual physiological, affective, and cognitive states (i.e. absence of *self-alienation*), secondly, the unimpaired behavioural and affective expression of a person's self-perceptions (*i.e. authentic living*), and, thirdly, the extent to which self-alienation and authentic living are free from undue social influences (i.e. not *accepting external influence*; p. 386).

A considerable body of research shows that aspects of authenticity are positively associated with measures of well-being. Subjects who report being authentic also report high positive affect, self-esteem, and subjective well-being (Goldman & Kernis, 2002; Sheldon, Ryan, Rawsthorne, & Ilardi, 1997; Wood et al., 2008). Individual differences in authenticity are thought to be rooted in experiences in childhood and adolescence. According to Harter (2002), the validation of the child's own experiences by the parents is a central developmental precursor of authenticity (p. 386).

The study of authenticity in personality psychology is limited in at least two ways. Firstly, its measures are typically situated on a phenomenological level, i.e. not the actual but only the perceived self-awareness or authentic living are measured. Secondly, while it considers distal antecedents of authenticity, such as parenting styles, it disregards more proximal antecedents of authenticity that may lie in aspects of the situation or in the person's current state. For example, social threat or pressure may lead to unauthentic behaviour, as compared to more relaxed situations. The personality approach to authenticity remains mute about the question through what processes a person selects and realizes goals that may be considered authentic, i.e. an expression of the real self.

The present thesis concerns the self-awareness aspect of authenticity (see Wood et al., 2008). However, as opposed to the personality approach to authenticity, the present research focuses on self-awareness in the process of goal selection. Moreover, knowledge of the own person is conceptualized in terms of objective, not merely subjective accuracy of self-knowledge. Taken together, the present work investigates the processes that allow people to

select goals that are objectively in line with their self. These processes are subsumed under the term self-access.

In three papers, theoretical, methodological, and empirical questions about self-access are tackled. More specifically, these questions concern the interrelations between different theories of self-access, the measurement methods used in self-access research, and the empirical testing of state and trait antecedents of self-access.

In the following, I, firstly, briefly review goal-selection research. Secondly, I define self-access. Thirdly, I look at research on self-access in goal selection from three perspectives. Finally, I give an overview of the three papers included in the present thesis.

How Goals Are Selected

Goal selection refers to the act of choosing one's own goals from a larger number of possible goals. To avoid confusion, I propose the term *goal setting* should be reserved to denote the formulation of a given goal in terms of, for instance, wording and framing (Locke & Latham, 2002). Thus, while goal selection refers to the question of *what* goals are chosen, goal setting refers to the question of *how* these goals are cognitively and verbally represented. While both aspects have implications for goal striving (Gollwitzer & Oettingen, 2012), the former is more relevant to questions of the authenticity of goals.

A number of theories concern the antecedents and processes involved in the selection of goals. In the following, I briefly discuss goal selection according to the model of action phases, theories of decision-making, and theories on the self-regulation of decision-making.

According to the model of action phases (Gollwitzer, 1990), the goal-selection process is initiated by wishes that are derived from motives (i.e. implicit needs; McClelland, 1985). Because time and other resources are scarce, not all wishes may be put into action. Therefore, some of the wishes need to be selected and made into intentions (i.e. into goals). According to Gollwitzer (1990), this selection process is based on a contemplation of the *feasibility* and *desirability* of wishes. Feasibility concerns the perceived likelihood that a certain outcome can be achieved given the restrictions of one's resources and of the situation, for instance, lack of ability or time constraints. Desirability concerns the question to what extent the expected

consequences of a certain path of action, as a whole, are thought to be pleasant or unpleasant (Gollwitzer, 1990, p. 56). Thus, according to this model, goal selection is based on a comparison between wishes with respect to the expected value of the anticipated consequences of actions.

Gollwitzer's account of goal selection is similar to normative theories of decision-making in that it focuses on the cognitive processing of expectancy and value information. Normative theories of decision-making hold that, when making a decision, a person should try to maximize the expected utility (or value) of the consequences of choosing a certain option (see, e.g., Edwards, 1954). Simon (1955), however, criticized normative decision theories for ignoring the psychological processes that underlie decision-making. More specifically, he argued that the decision-maker typically has limited information as well as a limited capacity for processing the available information. Based on this notion of *bounded rationality* (Simon, 1955), decision theorists have argued that decisions are often based on relatively simple, sequential *heuristics*, which, nevertheless, often lead to good decisions (Gigerenzer & Goldstein, 1996; Tversky & Kahneman, 1974).

The process of goal selection ends with the establishment of a commitment to the goal, i.e. of a feeling that the selected course of action is personally important and will be pursued even in the face of obstacles. Like goal selection, commitment to a goal is thought to depend on the expected value of anticipated action outcomes (Klein, Wesson, Hollenbeck, & Alge, 1999). Goal commitment may be regarded as a measure of how much a selected goal is wanted.

However, goal commitment does not solely depend on the goal-related subjective values and expectancies but also on processes that integrate these two kinds of information. According to the *theory of fantasy realization* (Oettingen, Pak, & Schnetter, 2001), the way in which value and expectancy information are processed affects goal commitment. In a number of studies, Oettingen et al. (2001) tested the hypothesis that mentally contrasting the positive future (i.e. the value of achieving the goal) with the negative reality (i.e. on factors that speak for high task difficulty) has an impact on goal commitment. Results indicated that goal commitment was unrelated to expectations of success after subjects had focused on either the positive future or

the negative reality. However, after subjects had contrasted the desired future with the present reality, goal commitment was positively associated with expectations of success. Thus, experiencing the discrepancy between present and future made subjects commit to goals that were perceived as relatively easy to achieve and refrain from committing to goals that were relatively hard to achieve (for a summary, see Gollwitzer & Oettingen, 2012).

In sum, according to different lines of research, choice of and commitment to goals depend on the integration of expectancy and value information. Recent research from the psychology of decision-making suggests that this integration of information is not exhaustive but highly selective. In addition, mental contrasting of value- and expectancy-related cognitions affects goal commitment, more specifically its association with expectations of success.

A number of criteria have been used to evaluate the selection of a given goal. Such criteria include the adherence to mathematically derived axioms (e.g. Tversky & Kahneman, 1974), post-choice satisfaction (e.g. Wilson et al., 1993), or well-being (e.g. Sheldon, Ryan, Deci, & Kasser, 2004). Another criterion for good goal choice is whether, in the process of goal selection, the self is accessed to a larger or smaller extent. This concept of *self-access* is defined in more detail in the following.

Defining Self-Access

Self-access is a relatively uncommon technical term which, however, is used here with good reason. In the following, self-access is defined based on definitions of self and self-knowledge. In short, self-knowledge is the accuracy of the self's subjective representation. Self-access refers to processes that enable self-knowledge.

Self

Unfortunately, some researchers have considered it unneccessary to define *self*, even though this term is central to their theories. Kohut (1977), for example, in his book *The restoration of the self*, explicitly refuses to furnish the concept of self with an exact definition (p. 310 ff.). Similarly, Baumeister (1998), in his chapter entitled "The self", does not attempt to define the term but merely refers to the word's colloquial usage everybody is assumed to be

familiar with (p. 681).

Defining the self, however, is possible. The psychoanalyst Heinz Hartmann (1964) defined the self in comparison to the ego. The self, he proposed, refers to the own person, as opposed to the object (e.g. the other person), while the ego refers to the "a psychic system" that is "opposed to other substructures of personality" (i.e. the super-ego or the id; p. 127). In a similar vein, the philosopher John Perry (1996) considers it "a straightforward view . . . that the self is just the person" (p. 524).

This view is contrary to the idea that the self is an entity within the mental system. According to Sheldon and Elliot (1999), for instance, the self is not the whole person but part of the person, namely the "center of agentic activity" (p. 483). In my opinion, however, the self in terms of the center of agentic activity is not a clearly definable concept and therefore of little use for empirical research. The self in terms of the person, by contrast, is a well-defined concept that refers to a human being as viewed from his or her own perspective.

In the present research, the term self generally refers to the person. It may also refer to any aspect of a person, be it cognitions, emotions, motivations, or bodily functions. It refers to a *specific* entity within a person—an entity that is more true or central than other entities—, however, when the term self is used in the context of a theory that suggests such a definition, for instance, in the context of personality systems interaction theory (PSI theory; Kuhl, 2000) or the self-concordance model (SCM; Sheldon & Elliot, 1999).

From Self-Knowledge to Self-Access

Before I define self-access, it is useful to introduce the closely related term *self-knowledge*. Self-knowledge (for summaries, see Vazire & Carlson, 2010; Wicklund & Eckert, 1992; Wilson, 2009; Wilson & Dunn, 2004) is knowledge of the own person, or of certain aspects thereof. A person may know any aspect of the own person more or less accurately. According to Wilson and Dunn (2004), these aspects may be perceptions, motor abilities, personality, attitudes, or self-esteem. In personality psychology, for instance, self-knowledge of one's own traits has been measured by comparing self-report with behavioural measures of traits, or by comparing self-perception with the perception by others

(Vazire & Carlson, 2010).

Comparisons between subjective and (more) objective measures of self-aspects are, strictly speaking, not measures of self-knowledge. According to philosophical theory (for a summary, see Ayer, 1956), holding a true belief is not a sufficient condition for knowledge. Rather, knowledge is defined as a true belief which, in addition, is in some way justified, for example, by accurate perception or valid reasoning.[1] Therefore, a belief about the own person that is objectively true does not constitute self-knowledge. A reliable process or mechanism that justifies the belief about oneself is an additional necessary condition. In the present research, the term self-access refers to such processes and mechanisms.

Self-access was defined more narrowly in personality systems interaction theory (Kuhl, 2000), from which the term originated. Kuhl (2000) conceptualized the self as a memory system, more precisely as "an extended network of representations of own states, including personal preferences, needs, emotional states, options for action in particular situations, and past experiences involving the self" (p. 131). Based on this definition, Baumann and Kuhl (2003) introduced the term self-access to refer to access to the contents of the self. Thus, self-access refers to the retrieval of self-related information from a specific memory system. In the present research, by contrast, the term self-access is used in a broader sense. It refers to any process that makes self-knowledge available, including accurate self-perception and successful retrieval of self-related information from memory.

Taken together, self, self-knowledge, and self-access are different aspects of self-access theories. Firstly, self-access theories need to define that which is accessed, here called the self. Secondly, they need to provide a means to assess people's knowledge of the self. Thirdly, they should specify processes that make self-knowledge possible.

Self-knowledge and self-access are especially important during the selection of goals. Choosing goals that are based on a false view of the own person may lead to futile efforts, overexertion, and the frustration of needs. The present research focuses on *self-access in goal selection*.

Self-Access in Goal Selection: Three Perspectives

Self-access in the process of goal selection is thought to allow the alignment of one's goals with one's self or personality (e.g. Job & Brandstätter, 2009). In other words, self-access enables the selection of goals that fit the self. However, the question through which processes this alignment is achieved is subject to debate. Self-access in goal selection may be studied from at least three perspectives, namely from a theoretical, a methodological, and an empirical perspective.

With respect to the theoretical perspective, the problem of defining self-access in goal selection has been discussed above. Another theoretical problem concerns the question of what mental structures and what processes underlie self-access. As mentioned above, some theories hold that there is a mental entity—a part of the self as defined above—that contains the person's true preferences and evaluations. Is this assumption plausible? If so, how can this entity be described? Furthermore, under what conditions can the contents of that entity be accessed? Are there individual difference and/or situational variables that determine how easily aspects of the self can be accessed? Such questions are addressed by a number of theories, for instance, by motive disposition theory (Thrash, Cassidy, Maruskin, & Elliot, 2010), personality systems interaction theory (Kuhl, 2000), the self-concordance model (Sheldon & Elliot, 1999), or by certain decision-making paradigms (Lee, Amir, & Ariely, 2009). However, even though the different theories are apparently referring to the same phenomenon, the question how they are related to each other is yet unanswered. Clarifying the similarities and differences between flavours of self-access theories may prove fruitful for the development of self-access theory as a whole.

From a methodological perspective, a crucial question concerns the measurement of self-access. Developing a measurement technique is not a trivial undertaking because an objective measure of the "real self" is difficult to achieve. However, such a measure is a prerequisite for assessing the accuracy of the subjective self relative to the "real self". In research on self-access in goal selection, a variety of strategies for assessing self-access have been used, including projective tests (McClelland, Koestner, & Weinberger, 1989) and

self-reported autonomy of action-regulation (Sheldon, 2002). It is unclear, however, whether the different measurement methods correspond to one common self-access construct. Moreover, an objective measure of self-access that is straightforward, reliable, and economical needs yet to be developed.

The empirical perspective is situated at the intersection of the two perspectives discussed above: In empirical studies, methods for the measurement of self-access are used to test claims made by self-access theories. The most prominent research questions concern the antecedents and the consequences of self-access deficiencies. Both are relevant for applied settings. Knowledge of the consequences of self-access deficiencies highlights the importance of intact self-access for well-being and personal growth. Knowledge of the antecedents, in turn, is a prerequisite for the development of intervention techniques that enhance self-access. While a large body of research has been concerned with the consequences of self-access deficiencies (see, e.g., Thrash et al., 2010, for a summary), fewer research exists on the antecedents of self-access deficiencies (e.g. Kuhl & Kazén, 1994). Therefore, the present research focuses on the antecedents of self-access.

In sum, the three big questions in research on self-access in goal selection are: What are the similarities and differences between self-access theories? How can self-access be measured? Does the evidence support the theoretical claims about the antecedents of self-access deficiencies? The present work aims at increasing knowledge with respect to each of these questions.

The Present Research

The present research goes beyond previous research in several ways. Firstly, as mentioned above, the topic of self-access has been treated in a number of theories. However, a synoptic view of these theories has not been attempted so far. In the present research, the topic will be discussed from an overarching perspective. Secondly, in previous research, self-knowledge (Wicklund & Eckert, 1992; Wilson, 2009) has been the phenomenon under investigation. The present research goes beyond the question of how well people know themselves by adding the question of through what processes people can make use of their—possibly

latent—self-knowledge, in other words, the question of how people access their self. Thirdly, because humanistic psychology has been traditionally intertwined with phenomenology (Churchill & Wertz, 1985), some researchers of the humanistic school have focused on subjective measures of self-access. As I, however, define self-access in terms of the justified accuracy of a belief about the own person, objective measures of self-access are more appropriate than subjective measures (see Wicklund & Eckert, 1992, Chapter 4). Thus, the present research focuses on objective measures of self-access, i.e. on those measures that do not rely solely on self-reports. Fourthly, while some research on self-access, notably from the decision-making domain, has focused on situational factors, other research has been limited to personality factors that affect self-access. The present research, in contrast, is based on the assumption that situational as well as personality variables are needed to fully account for differences in self-access.

In three papers, unresolved issues in self-access research, which have been discussed above, are addressed. While the first paper focuses on theory and methodology from an overarching perspective, the second and third paper focus on the validation of measurement methods and the prediction of self-access.

Paper 1: Self-Access as Dual-System Communication

As mentioned above, self-access in goal selection has been explained by a variety of models from motivation and decision-making research. In the first paper, the similarities and differences of the various models are analysed. This results in a meta-theoretical framework of self-access models, the *dual-system communication framework*.

According to the framework, the various models of self-access in goal selection agree that self-access is based on a transfer of information between two systems. While one system contains self-related information that is, in general, not consciously accessible, the other system is responsible for conscious processes, such as verbal descriptions or volitional control. Whether self-access takes place depends, according to the framework, on the availability of a certain mode of processing. The framework includes a classification of models of self-access in goal selection.

Furthermore, decision-making theories of self-access, as well as their relationship to the dual-system communication framework are discussed. Finally, the framework is used to generate research questions on theoretical and methodological aspects of self-access in goal selection.

Paper 2: Self-Infiltration as a Measure of Self-Access

This paper reports on a replication study that tested a theoretical assumption of personality systems interaction theory (Kuhl, 2000). In science, replications are necessary to ensure that false-positive research results are corrected in the long run (Pashler & Harris, 2012).

Personality systems interaction theory holds that subjects with a low action-orientation—i.e. subjects who recover more slowly from stressful experiences—, have reduced self-access capabilities (Kuhl & Kazén, 1994), especially when they are in a state of negative affect (Baumann & Kuhl, 2003). In the context of personality systems interaction theory, the confusion of self- with other-generated goals, the so called *self-infiltration*, serves as a measure of self-access.

In a laboratory experiment, it was tested whether self-infiltration was predicted by the combined effect of action-orientation and negative affect, as had been shown in previous research (Baumann & Kuhl, 2003). In a further attempt to show that self-infiltration is indeed a measure of self-access, individual difference variables associated with self-access were included in the study.

Because self-infiltration is a memory paradigm, data analysis included calculations according to the signal-detection approach. Based on this approach, a new method of analyzing self-infiltration data is proposed.

Paper 3: Self-Access and Preference Consistency

The self-infiltration paradigm just mentioned, as well as other self-infiltration measures (e.g. motive-goal congruence; Thrash et al., 2010) suffer from the disadvantage of being time-consuming with respect to data collection and analysis. Working with the picture story exercise (McClelland et al., 1989, PSE;) requires content analysis of verbal material. A

measurement of self-infiltration requires sessions of one hour or more per subject. Therefore, a more economical alternative to these self-access measures would be of use.

In the third paper, the consistency of preferences is proposed as an alternative measure of self-access. More specifically, the internal consistency of preference judgements, on the one hand, and the agreement of preference judgments with choices, on the other hand, were hypothesized to be self-access measures. In three studies, self-access was expected to depend on the combined effect of action-orientation and negative affect, as is the case in self-infiltration research.

This series of studies was situated at the intersection of goal-selection and decision-making research, which allows insights into the characteristics of both research traditions. While in goal-selection research it is taken for granted that motivational trait variables partly explain choice, the existence of such trait variables is disputed in the field of decision-making.

Notes

[1] For instance, imagine that you believe that your train will depart on Platform 1. However, your belief is based on a memory error because, according to the timetable, your train should depart from Platform 3. If your train departs, nevertheless,—due to construction work or technical fault—on Platform 1 your true belief does not constitute knowledge because it was not justified by a valid process of knowledge generation.

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Self-Access in Goal Selection Explained by Communication between Dual Systems

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Abstract

A number of models used in the psychology of motivation include assumptions about self-access in goal selection, i.e. about a person's ability to choose goals according to his or her needs and preferences. Examples of such models include the information-processing model of implicit and explicit motives, the self-concordance model, and PSI theory. In the current paper, the literature on self-access is reviewed and a meta-theoretical framework for self-access models is developed. According to the resulting dual-system communication framework, self-access is explained by communication between one system, in which implicit evaluative dispositions are stored, and a second system that mediates the conscious control of action. Whether communication is successful depends on whether the mode of processing is appropriate to the mode of representation of the memory contents to be processed. Based on this dual-system communication framework, models of self-access in goal selection are compared, classified, and related to models of self-access from the decision-making domain. The framework is then used to derive ideas for future research.

Keywords: self-knowledge, self-access, motivation, decision-making, dual processing

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A *goal* is "a cognitive representation of a future object that the organism is committed to approach or avoid" (Elliot & Fryer, 2008, p. 244), where the term *object* typically refers to an entity, event, experience, or characteristic. According to Locke and Latham (2002), goals exert their influence through four mechanisms. They direct attention and effort toward goal-relevant activities; they energize behaviour; they lead to persistence in a task; and they lead to the "arousal, discovery, and/or use of task-relevant knowledge and strategies" (p. 706 f.). While these mechanisms may apply to the effects of goals in general, Locke and Latham held that goals are particularly effective when they are both specific (as opposed to do-your-best goals) and challenging. Thus, the formation of well-designed goals enhances performance, e.g. in work and school contexts.

The goal-selection[1] process and the function it serves have been described in the model of action phases (Gollwitzer, 1990). According to Achtziger and Gollwitzer (2008), a person's motives, i.e. his or her dispositional needs, produce certain wishes, a large number of which are present at any point in time. As the available resources, e.g. the total available time, is limited, only a small portion of a person's wishes may be translated into action. Goal selection is described as a weighing up of pros and cons, in the course of which the desirability and feasibility of action outcomes is considered (cf. Gollwitzer & Oettingen, 2012). Thus, the available resources are distributed among a small portion of wishes by turning a limited number of wishes into binding goals.

In the course of the translation process from motives to wishes to goals, a person needs to retrieve valid, self-related information from memory in order to achieve a fit between goals and underlying dispositions. Baumann and Kuhl (2003) called this retrieval process *self-access* (cf. Quirin & Kuhl, 2008). The current work is based on the assumption that self-access in goal selection differs between individuals, and that these differences have consequences for action regulation and well-being.

Choosing goals in accordance with underlying dispositions may be beneficial for two reasons. Firstly, goals which are, in some way, out-of-tune with underlying dispositions may be more difficult to pursue because the discordance within the organism may interfere with

optimal motivation. Whether a goal is supported by underlying dispositions may be particularly relevant when the action taken is not running smoothly and the continuation of goal pursuit is called into question. Secondly, successfully achieving a goal that is discordant with underlying dispositions may not be as rewarding as a goal that is rooted in higher-level dispositions, needs, or values. Therefore, choosing inappropriate goals may reduce effort and persistence, as well as positive affect following success.

The choice process has been an issue in two theoretical traditions: While motivation psychology has focused on the dispositional and affective antecedents of goal selection, the psychology of decision-making has focused on situational and cognitive antecedents of choice. Both traditions, however, have contributed to self-access research. Therefore, in addition to goal-selection models that are rooted in motivation psychology, we also consider decision-making models. In the current paper, we review contemporary models of self-access in goal selection and their respective paradigms, and connect them with related models from the psychology of decision-making. Ideas for future research are then derived from the resulting meta-theoretical framework.

In particular, three points are made. Firstly, we argue that current models of self-access in goal selection fit a meta-theoretical framework which explains self-access by means of the communication between dual systems. Secondly, we classify the paradigms used in self-access research according to two criteria: (a) the extent to which theoretical reasoning and empirical methods tap into self-access processes as such; and (b) consideration of interpersonal processes, i.e. of coping with social influence. Thirdly, we review self-access models and paradigms from decision-making research and show how they are related to models of self-access in goal selection.

Models of Self-Access in Goal Selection

In the following, we present four prominent models that are closely related to self-access in goal selection: motive disposition theory (MDT; McClelland, 1985), the information processing model of dual motivation (IPM^2; Schultheiss & Strasser, 2012), the self-concordance model (SCM; Sheldon & Elliot, 1999), and personality systems interaction

theory (PSI theory Kuhl, 2000). This review serves as a basis for comparing and classifying models of self-access in goal selection.

Congruence between Systems: Motive Disposition Theory

MDT, as advocated by McClelland (1985), was not originally considered a self-access model. Nevertheless, the model needs to be included in the literature review as, firstly, it is an important ancestor of current models of self-access in goal selection and, secondly, it has been reinterpreted as such a model in recent times.

According to Weinberger and McClelland (1990; cf. McClelland, 1985), a *motive* is an *anticipatory goal state* which consists of the expectation that a natural incentive—i.e. a stimulus that innately and automatically elicits positive affect—might become available if a certain behaviour is executed. For instance, doing something better—in other words, surpassing a standard of excellence—is the natural incentive for the achievement motive (McClelland, 1985, p. 228). Thus, the achievement motive consists of the expectation that a "consummatory affective experience" (McClelland, 1985, p. 136) related to doing something better may be reached through appropriate behaviour.

In addition, motives have been defined as personality traits. These *motive dispositions* are characterized by a heightened sensitivity and attention to a specific natural incentive, which leads to a higher probability that the corresponding motive will be aroused. This, in turn, leads to behaviour aiming at experiencing the consummatory affect (Weinberger & McClelland, 1990).

The number of natural incentives is assumed to be limited (Weinberger & McClelland, 1990). Consequently only a limited number of motives exist, each of them aimed at the consummatory affective experience related to a specific natural incentive. In MDT, three motives have received the most attention: the achievement, affiliation, and power motives (McClelland, 1985). Subjects scoring high on dispositional measures of these motives are thought to be particularly sensitive to the incentives of (a) surpassing a standard of excellence (achievement), (b) engaging in positive social relationships (affiliation), or (c) exerting influence on other people (power), respectively.

The measurement of motives and the dual-systems model of motivation. From the beginnings of motive research (McClelland, Atkinson, Clark, & Lowell, 1953), motives were assumed to be inaccessible through direct introspection, which is why they are also called *implicit motives*. Therefore, self-report measures were not thought to be suitable for the measurement of motive dispositions. Instead, an adaptation of the Thematic Apperception Test (TAT[3]; Murray, 1943) was used. In this test, subjects are required to generate stories based on photographic stimuli. Inferences about the subject's personality characteristics are made by counting the occurrences of certain content categories. Content coding systems were developed for the three motives mentioned above, allowing content analysis to be standardized across different coders (Winter, 1991).

The TAT measure has been criticized as having unsatisfactory retest reliability as well as low internal consistency (Entwisle, 1972). However, in recent years, Schultheiss and colleagues have collected empirical and meta-analytical evidence showing that retest stability is higher than previously thought (e.g. $r = .52$ for a 1-month interval; Schultheiss, Liening, & Schad, 2008; Schultheiss & Pang, 2007). Moreover, they argued that internal consistency measures are not suitable for the TAT measure, as the construct to be measured—because of its motivational nature—is unlikely to remain constant during the measurement period (Schultheiss & Pang, 2007). Therefore, reliability of TAT-based motive measures may be considered "sufficient for research purposes" (Schultheiss, 2008, p. 610).

Correlations between TAT motive measures and self-report measures of the same motives are typically close to zero (see Schultheiss, 2008). While critics have interpreted this fact as a lack of convergent validity, possibly based on poor reliability (Entwisle, 1972), supporters have argued that the constructs measured by TAT versus self-report instruments are—even though they are aimed at measuring motives of the same content classes—fundamentally distinct (McClelland, Koestner, & Weinberger, 1989; Weinberger & McClelland, 1990). Two motive constructs have been proposed: the TAT-based implicit motives and the self-report-based *explicit* or *self-attributed motives*.

Subsequent research revealed that the two types of motives predict different classes of behaviour, and interact with different classes of cues or incentives (McClelland et al., 1989;

Brunstein & Hoyer, 2002; for a meta-analysis in the achievement domain, see Spangler, 1992). Schultheiss (2008) concluded that performance measures are better predicted by implicit than explicit motives, while choices and judgements are better predicted by explicit than implicit motives. With respect to the type of cue interacting with each of the two motive types, Schultheiss (2002) proposed that symbolically represented incentives are more likely to interact with explicit motives, while experientially represented incentives are more likely to interact with implicit motives. The IPM (Schultheiss & Strasser, 2012), which is based on this thinking, is discussed below.

Given the dissociation between explicit and implicit motives, McClelland et al. (1989) concluded, that, in "evoluationary terms, a conscious motivational system has been built on top . . . of a more primitive motivational system" (p. 699). Stanton, Hall, and Schultheiss (2010) labelled this view the *dual-systems theory of motivation* (cf. Schultheiss & Brunstein, 1999).

Congruence between motivational systems predicts well-being and health. Based on cases of observed statistical orthogonality, the two motivational systems were thought to be functionally independent (McClelland et al., 1989; Weinberger & McClelland, 1990). At the same time, McClelland et al. (1989) speculated that discordance between the two systems, in terms of implicit and explicit motives, "can certainly lead to trouble" (p. 700). Thus, while the two systems were not thought to interact or to have common antecedents, their misalignment was judged to be disadvantageous. Subsequently, researchers have attempted to show that congruence between implicit and explicit motives positively predicts subjective well-being, self-reported symptoms, or life satisfaction.

Several studies have found a main effect of congruence between motives on well-being and health-related variables. In three studies, Baumann, Kaschel, and Kuhl (2005) showed that subjects whose implicit achievement motive matched their explicit achievement motive reported higher subjective well-being and fewer emotional and somatic symptoms. In other studies, congruence between motives was related to unhealthy eating behaviour, as well as negative affect (Job, Oertig, Brandstätter, & Allemand, 2010), and volitional depletion (Kehr, 2004).

In addition, research by Kazén and Kuhl (2011) revealed that the direction of

incongruence—i.e. whether the implicit motive is higher than the explicit motive, or vice versa—matters. Managers whose implicit power motive was lower than their explicit power motive reported lower subjective well-being and higher life-stress. At the same time motive-incongruence as such, irrespective of direction, did not predict well-being or stress. These results indicate that striving for goals that are not supported by a strong implicit motive—and therefore may be experienced as less pleasurable—is particularly detrimental to well-being.

The studies discussed so far were concerned with congruence between implicit and explicit motives—i.e. between two individual difference variables. In recent years, however, research on motivational congruence has increasingly focused on congruence between implicit motives and goals. In this line of research, the hypothesis was tested that subjects who select their (explicit) goals in concordance with their implicit motives should experience better health and well-being (for a review, see Brunstein, 2010).

In an early study by Brunstein, Lautenschlager, Nawroth, Pöhlmann, and Schultheiss (1995), subjects reported their personal strivings and classified them as either agentic or communal (see, e.g. Abele & Wojciszke, 2007). Agentic and communal strivings were thought to be congruent with power and intimacy motivation, respectively. As predicted, the well-being of subjects whose strivings thematically matched their implicit motives was higher than the well-being of subjects whose strivings were discordant with implicit motives.

Hofer and colleagues (Hofer, Busch, Bond, Li, & Law, 2010; Hofer & Chasiotis, 2003) replicated this effect in a number of studies using cross-cultural designs. Congruence between implicit achievement and affiliation (but not power) motives and explicit life goals predicted life satisfaction in Zambian adolescents (Hofer & Chasiotis, 2003). Congruence between the implicit power motive and explicit power goals predicted positive (but not negative) affect in a mixed German and Chinese sample (Hofer et al., 2010).[4] In a study by Gröpel (2008), by contrast, motive-goal congruence was not related to subjective well-being in a sample of managers.

Further research has shown that, in some cases, congruence only predicts well-being and health under certain conditions. Schüler, Job, Fröhlich, and Brandstätter (2008) found that

congruence between implicit and explicit affiliation motives was beneficial only in subjects who, in addition, showed affiliation-related behaviour. Similarly, in a study by (Püschel, Schulte, & Michalak, 2011), motive-goal congruence in a sample of outpatients only reduced depressive symptoms when goal progress was high. These two studies may indicate that well-being need not benefit from motive-goal congruence if motive-congruent behaviour is either not shown, or not successful.

In sum, even though the evidence is not abundant, it generally supports the hypothesis that congruence between implicit and explicit motives, or congruence between implicit motives and goals, are positively related to well-being and health variables.

Methodological factors and personality traits predict implicit-explicit congruence. While Weinberger and McClelland (1990) believed the implicit and explicit motive systems to be functionally independent, this view has been called into question by research showing that implicit-explicit congruence depends on methodological factors as well as personality traits (for a review, see Thrash, Cassidy, Maruskin, & Elliot, 2010). Thrash, Elliot, and Schultheiss (2007) measured the explicit achievement motive using several different instruments, where the implicit achievement motive was coded according to Heckhausen (1963). The implicit motive was only significantly correlated with the explicit measure designed to match Heckhausen's coding system in content ($r = .17, p < .05$) but not with other explicit motive measures. Thrash et al. (2010) concluded that the implicit-explicit correlations may have been underestimated in previous research.[5]

In a number of studies, trait measures related to volitional competences have been shown to predict implicit-explicit congruence. Subjects high in self-reported volitional strength, as measured by the Volitional Components Inventory (VCI; Kuhl & Fuhrmann, 1998), were more congruent than subjects low in volitional strength. Similarly, Baumann et al. (2005) found that subjects high in action orientation, as measured by the Action Control Scale (ACS-90; Kuhl, 1994) were more congruent than state-oriented subjects (cf. Brunstein, 2001). Furthermore, subjects who described themselves as more self-determined, i.e. as autonomous, on the Self-Determination Scale (SDS; Sheldon & Deci, 1996) were more congruent than less self-determined subjects (Hofer et al., 2010; Thrash & Elliot, 2002). These studies support the

hypothesis that subjects with higher volitional competences and higher subjective autonomy display higher congruence between implicit and explicit measures of motivation.

Thrash et al. (2007) identified additional trait predictors of congruence. Implicit-explicit congruence was higher in subjects with a high level of private body consciousness (Miller, Murphy, & Buss, 1981), a low level of self-monitoring (Snyder, 1974), and a high preference for consistency (Cialdini, Trost, & Newsom, 1995). These findings suggest that subjects who are more aware of their own body processes (private body consciousness) and who are more concerned with the social appropriateness of their behaviour (self-monitoring), as well as with appearing consistent (preference for consistency), are more congruent.

In sum, a number of methodological as well as trait predictors of implicit-explicit congruence have been found. Consequently, the two motivational systems cannot be entirely independent. Furthermore, it may be assumed that there are processes that promote or hinder motivational congruence. To date, these processes have not been exhaustively researched. Thrash et al. (2010) pointed out that such processes may comprise (a) influences of an implicit on an explicit motive, (b) influences of an explicit on an implicit motive, or (c) common antecedents of the two motive types. However, the prominent process theories of implicit-explicit congruence are of type (a). They assume that the contents of the implicit system may find their way, however indirectly, to the explicit system, a process we have called self-access above. Processes that promote motivational congruence lie at the core of the self-access model to be discussed next, the IPM.

An Information-Processing Model of Dual Motivation

The dual-system model of motivation, as depicted by McClelland (1985), relies on concepts taken from behaviourist and psychodynamic traditions. For example, the model explains behaviour—in a behaviouristic fashion—primarily through classical and operant conditioning processes, while cognitive contents—like goals—are not considered to be predictors of behaviour. Furthermore, the assumption of strictly independent conscious and unconscious processes seems to be borrowed from Freudian theory. Schultheiss (2002; Schultheiss, 2007; Schultheiss & Strasser, 2012), in his IPM, revised McClelland's theory,

focusing on cognitive processes to describe the duality of motivation and individual differences in self-access.

Weinberger and McClelland (1990) proposed that implicit motives are acquired prior to language acquisition, while explicit motives are generally learnt within the medium of language. Drawing on this distinction, Schultheiss and Strasser (2012) postulated, that dissociations between implicit and explicit motives are primarily based on the implicit system's affinity for processing non-verbal—or experientially represented—information and the explicit system's affinity for processing verbal—i.e. symbolically represented—information. In this vein, the IPM explains why (1) the implicit and the explicit motive interact with different kinds of cues or incentives, (2) predict different kinds of outcome variables, and (3) are preferably measured using different kinds of instruments (Schultheiss & Strasser, 2012; cf. Schultheiss, 2002).

Thus, the implicit and the explicit systems seem to process information separately and in different modalities. However, communication between the implicit and the explicit motivation system is possible, namely through *referential processing*, a process originally proposed by Paivio (1986) in his dual-coding theory.

Referential processing and competence. Referential processing refers to the translation of non-verbally represented information into a verbal format (*naming*) and the translation of verbally represented information into a non-verbal format (*imagining*; Schultheiss & Strasser, 2012). According to the model, subjects engaging in referential processing should have motivation systems that are better aligned than those of subjects not engaging in such activity. Evidence from two types of studies supports this hypothesis. Firstly, the impact of goal imagery on the alignment of explicit goals and implicit motives was determined. Here, goal imagery may be interpreted as an induction of referential processing. Secondly, the subjects' ability to engage in referential processing—an individual difference variable called *referential competence* (RC; Schultheiss, Patalakh, Rawolle, Liening, & MacInnes, 2011)—predicted motivational congruence.

Experimental induction of goal imagery. Schultheiss and Brunstein (1999) tested the hypothesis that goal imagery enhances the congruence between implicit motives and goal

commitment. Their subjects were expecting the task of counselling another participant. The task was framed so as to include both affiliation and power incentives. Subjects in the experimental group were led by pre-recorded instructions to imagine the successful course of the counselling task. The instructions used concrete language that was rich in sensory detail. No imagery task was included in the control group. Goal commitment and affective arousal were measured. Following goal imagery, subjects who were high in both their implicit power and affiliation motives reported higher commitment to the counselling goal and displayed a bigger change in affective arousal through the imagery task than subjects who were low on at least one motive (Schultheiss & Brunstein, 1999, Study 1). Without goal imagery, no such differences emerged.

In three studies, Job and Brandstätter (2009) set out to conceptually replicate the result of Schultheiss and Brunstein (1999). In their first study, subjects were asked to put themselves in the place of a person about to start a new job. Subsequently, subjects were asked to choose some goals from a list of 15 goals related to the current scenario. Subjects in the *affect focus* (i.e. affective goal imagery) condition imagined what it would feel like to strive for each goal. Subjects in the *self-focus* (i.e. cognitive goal imagery) control condition asked themselves, for each goal, whether or not it suited them. Subjects in a second control condition did not perform an imagery task. Results indicated that only subjects in the affect focus condition and with a high implicit affiliation motive chose more affiliation-related goals, relative to goals related to power or achievement (Job & Brandstätter, 2009, Study 1). An attempt to replicate the effect in the achievement domain yielded the expected, but only marginally significant, pattern of results (Job & Brandstätter, 2009, Study 2). In Study 3, the effect was replicated using a wider range of personal goals: Subjects high in agentic motives (i.e. power and achievement) reported higher commitment to agency-related goals in the affect focus condition, but not in the control condition.

The goal imagery task used in the studies by Schultheiss and Brunstein (1999) and Job and Brandstätter (2009) can be regarded as an induction of referential processing. Firstly, imagining processes were induced by instructing the subjects to vividly imagine striving for the goal (Job & Brandstätter, 2009, Studies 1 and 2), or striving for the goal and reaching it

(Schultheiss & Brunstein, 1999, Study 1; Job & Brandstätter, 2009, Study 3). In this way, the goal which may have been represented in a predominantly verbal format, was furnished with non-verbal ancillary information. Non-verbal representation was further extended by asking subjects about their feelings while striving for or on reaching the goal. Secondly, naming processes may also have been induced. While subjects imagined their goals, they were asked the question: "How do you feel?" (Job & Brandstätter, 2009; cf. Schultheiss & Brunstein, 1999). This question may have induced naming in that it encouraged subjects to verbalize the otherwise non-verbal affective processes.

According to the IPM (Schultheiss & Strasser, 2012), the verbal and non-verbal systems are separated by a communication problem similar to the one of two people speaking different languages. Translation in both directions—e.g. by an interpreter—is necessary to make successful communication possible. Thus, to allow self-access through the communication between a verbal and a non-verbal system, bidirectional translation is necessary. Firstly, the verbally represented goal needs to be translated into a non-verbal format in order to be evaluated by the non-verbal system. Secondly, the result of the evaluation—e.g. affective reactions—needs to be translated back into a verbal format to make it usable for conscious action control.[6]

Referential competence: Individual differences in referential processing. Apart from affective imagery studies, the relevance of referential processing for self-access can also be corroborated by conceptualizing referential processing as an individual difference variable, i.e. referential competence (Schultheiss et al., 2011; for a summary, see Schultheiss & Strasser, 2012). This variable was originally proposed by the clinical psychologists Bucci and Freedman (1978), who were interested in the relationship between therapeutic progress and the patients' narrative style. They developed a measurement method based on reaction times for the Stroop task (Stroop, 1935). As the naming of colour bars includes a translation from the non-verbal to the verbal modality, Bucci and Freedman proposed that colour-naming reaction times, relative to word-reading reaction times, constitute a measure of referential competence. To demonstrate the relevance of the construct for complex human behaviour, they measured it and analysed narrative data from their subjects. They came to the conclusion

that subjects with a high level of referential competence produced more specific, detailed descriptions of events than subjects with a low level of referential competence, while the latter produced more general descriptions of their own feelings than the former.

Schultheiss et al. (2011) tested the hypothesis that referential competence, measured using a computer-based version of the Bucci and Freedman (1978) procedure, is related to motivational congruence. In three studies, Schultheiss et al. (2011) showed that referential competence is positively related to the congruence between implicit motives on the one hand, and goal commitment (Studies 2 and 3) or goal preference (Study 4) on the other hand. However, in most cases referential competence did not predict congruence between implicit and explicit motives.[7]

Dual-system theories in the McClelland tradition as self-access theories. While McClelland et al. (1989) conceptualized the two motivational systems as being functionally independent, more recent research has shown that the implicit and the explicit motivational systems are able to communicate under certain circumstances. This assumption was necessary to explain the moderating effect of methodological factors, personality traits, and goal imagery induction on motivational congruence. It has been expressed in terms of a self-access assumption (e.g. Schultheiss & Strasser, 2012; Thrash et al., 2010). The underlying question is: How can human beings align their conscious planning and execution of actions with their subconscious wishes and needs?

The self-access models addressed so far have chiefly dealt with the various antecedents of motivational congruence. The model presented in the following, the SCM (Sheldon & Elliot, 1999), on the other hand, focuses on the consequences of motivational congruence.

The Self-Concordance Model

Sheldon and Elliot (1999) defined self-concordance as the "degree to which stated goals express enduring interests and values" (p. 482). According to the SCM (Sheldon, 2002, 2008; Sheldon & Elliot, 1999), whether a person's goals are self-concordant has implications for self-regulatory processes. Firstly, subjects are expected to exert more effort on self-concordant than on self-discordant goals, which should foster the attainment of self-concordant goals.

Secondly, attaining a self-concordant goal should satisfy needs to a larger extent and thus be more beneficial to one's subjective well-being than attaining a self-discordant goal.

Self-determination theory and the measurement of self-concordance. The SCM is based on self-determination theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000, 2008), which was originally developed to explain decreases in motivation through the introduction of external rewards (for a meta-analysis, see Deci, Koestner, & Ryan, 1999). To explain such effects, SDT distinguishes two types of motivation: *intrinsic* and *extrinsic*. Behaviour is intrinsically motivated if the actor finds "the activity itself interesting and personally satisfying"; in contrast to this, behaviour is extrinsically motivated if it is executed "because it leads to some separable consequence, such as the attainment of a reward . . . [or] the avoidance of a punishment . . ." (Ryan & Deci, 2008, p. 660; for a critical discussion of the intrinsic-extrinsic distinction, see Rheinberg, 2008).

According to SDT, intrinsic motivation is diminished when a person experiences an extrinsic motivating factor—e.g., the expectation of a reward—as controlling, because feeling controlled thwarts the satisfaction of people's innate need for autonomy (Ryan & Deci, 2008). However, extrinsically motivated behaviour does not necessarily feel controlled. People are able to "transform socially sanctioned mores or requests into personally endorsed values or self-regulations" (Deci & Ryan, 2000, p. 235 f.) through a process called *organismic integration* (Ryan & Deci, 2008). A behaviour's organismic integration status may range from external, through introjected, and identified, to integrated regulation (Ryan & Deci, 2008).

In SDT research, a behaviour's organismic integration status is measured by asking subjects to state the reasons for their behaviour, more precisely, to indicate the perceived locus of causality (PLOC; deCharms, 1968) with respect to their behaviour. If, for example, the reported reason for a particular form of behaviour is to avoid feelings of guilt, the behaviour's regulation is classified as introjected. If, on the other hand, a subject indicates that he or she endorses the value of the behaviour, the behaviour's regulation is classified as identified (see Deci & Ryan, 2000).[8] In the SCM (Sheldon, 2002), the PLOC is used as an indicator of a behaviour's—or goal's—self-concordance. The more internal the PLOC regarding a goal, the more self-concordant the goal is assumed to be (e.g., Sheldon & Elliot, 1999).

Empirical support for the SCM. As mentioned above, the SCM (Sheldon & Elliot, 1999) predicts that goal self-concordance facilitates goal-attainment and thus well-being, and that attainment of self-concordant goals enhances well-being to a larger extent than attainment of self-discordant goals. In the following, we review empirical studies that test these hypotheses.

In two early studies, Sheldon and Kasser (1995) measured the PLOC of personal goals, together with other measures of personality integration, and determined the relationship between the PLOC and various indicators of well-being. The PLOC—more precisely, the number of goals with an internal PLOC minus the number of goals with an external PLOC—correlated positively and significantly with well-being variables such as vitality, positive affect, self-esteem, and life satisfaction ($.20 <= r <= .30$).

In a longitudinal design, Sheldon and Elliot (1998, Studies 2 and 3) extended this finding by showing that subjects striving for goals with a high—as compared to a low—internal PLOC, exerted more effort and were subsequently more likely to attain their goals. Data from Sheldon and Elliot (1999) further support the view that self-concordance affects changes in well-being via effort and goal-attainment. In addition, their data are in line with the hypothesis that changes in well-being are mediated by need-satisfying experiences, i.e. by the experience of autonomy, competence, and relatedness. These experiences, in turn, are fostered particularly by the attainment of self-concordant, as opposed to self-discordant, goals.[9]

The basic assumptions of the SCM have been tested in applied settings such as the work context (Greguras & Diefendorff, 2010; Judge, Bono, Erez, & Locke, 2005), sports (Smith, Ntoumanis, Duda, & Vansteenkiste, 2011; Smith, Ntoumanis, & Duda, 2007), and school engagement and burnout (Vasalampi, Salmelo-Aro, & Nurmi, 2009), with results that in most cases support the model[10]. Sheldon and Houser-Marko (2001) extended the model by showing that goal-attainment and adjustment due to self-concordance may lead to more self-concordant goal selection in the future and, again, to increased goal-attainment and adjustment, which supports the notion of an "upward spiral" (p. 152) of positive outcomes. Finally, Sheldon et al. (2004) contributed evidence for the universality of the relationship between self-concordance and well-being. Such relationships were found in samples of US American, South Korean,

Taiwanese, as well as Chinese subjects.

In sum, the evidence included in published articles testing self-concordance hypotheses is almost unanimous. Studies are correlational—i.e. self-concordance in terms of PLOC is never manipulated—, but many of them feature a longitudinal design. The SCM may be considered a model with good empirical support.

Locating self-concordance in a model of personality. Based on a model by McAdams (1995), Sheldon (2008) placed the self-concordance construct into an overarching personality model. McAdams held that persons "should be described on at least *three separate* and, at best, *loosely related levels* of functioning" (p. 371, emphasis in original). According to McAdams, on Level 1, persons can be described regarding *personality traits*, which are relatively non-conditional, decontextualized, as well as comparative (p. 371). An example of personality traits are the Big Five personality factors (for a summary, see De Raad, 1998). On Level 2, persons can be described regarding *personal concerns*, which comprise a wide range of phenomena, such as motives, values, defence mechanisms, coping styles, and personal strivings, to name a few. What Level 2 phenomena have in common is that they are contextualized in "time, place, and/or role" (p. 376). On Level 3, persons may be described regarding the story they construct of their selves, in order to find unity and purpose in their lives. This level may be called the "level of identity as a life story" (p. 382). To fully describe a person, information must be provided about all three levels. Although McAdams does not exclude linkages between different levels a priori, he rejects theoretical assumptions of such linkages without a empirical foundation (p. 380). Furthermore, he is opposed to the idea of one level (e.g. Level 2: personal concerns) being a derivative of another level (e.g. Level 1: personality traits; p. 386).

Sheldon (2008) used McAdams's 1995 model to specify what entities are involved in self-concordance. In his own interpretation of McAdams's model, Sheldon (2004) added a fourth level, *organismic nature* (Sheldon, 2004, p. 46), which includes "basic personality processes, needs, and characteristics built into the psychology of all people, which are inherent to the human organism", in other words, innate and universal features common to all human beings.[11]

Based on the model of McAdams (1995), Sheldon (2008) defined self-concordance as "the degree of consistency or fit between the goal level of personality [Level 2; authors' note], and the organismic and trait levels of personality [Levels 4 and 1, respectively; authors' note]" (p. 468). The question of consistency between Levels 2 and 4 would seem to go beyond the scope of the self-access topic currently being discussed. It concerns the question of whether people's goals fit certain aspects of human nature as such, irrespective of individual differences. Self-access, as discussed here, by contrast, is concerned with the question of whether a person's goals fit his or her individual underlying dispositions. Defining self-access as a fit between Levels 1 and 2 proves fruitful, however. Self-concordance—or self-access in general—may be conceptualized as a fit between the relatively decontextualized personality traits on Level 1, and the contextualized personal concerns on Level 2. In this vein, self-access may be defined as the ability to adapt to the current life situation (Level 2) in a way that is consistent with the trait level of personality (Level 1).

The SCM as a self-access model. As a self-access model, the SCM differs from MDT and IPM in that the self-access measure in SCM research—i.e. the PLOC—is purely phenomenological. Thus, while motive disposition theories use the fit between self-report and non-self-report (i.e. projective) measures as an indicator of self-access, SCM research is based on the assumption that subjects are able to reliably report a proxy variable of self-access, i.e. the PLOC.

Sheldon (2008) admits that this method of measurement "does not directly assess the fit of goals . . . with the person's traits and his or her organismic needs . . . " but instead measures self-concordance on a phenomenological level. In fact, it is not clear in what way a goal's internalization status is a valid indicator of self-concordance. While it is plausible that a goal originating from one's needs is more likely to be internally than externally regulated, the possibility that a person strives for a self-chosen, internally regulated goal that does not fit his or her personality traits or needs cannot be ruled out. In other words, as people are thought to sometimes select goals that do not fit their personality—a hypothesis that the SCM puts forward—, it is questionable whether the PLOC is a valid indicator of the self-concordance of goals.

The next theory to be discussed, PSI theory (Kuhl, 2000), has similarities with self-determination research in that it takes into account the integration of goals that originate externally. It also has similarities with MDT in that it employs a non-self-report measure of the accuracy of self-related knowledge. However, it goes beyond MDT in that it defines self-access without recourse to motivational content.

Beyond Motives: Self-Access According to PSI Theory

PSI theory (Kuhl, 2000, 2001; for a summary, see Kuhl, 2008) seeks to explain individual differences in self-regulation, which includes the ability to form intentions according to implicit needs and preferences, to maintain intentions and translate them into actions, as well as the capacity for self-development, i.e. for personal growth based on the integration of novel and unpleasant experiences. The theory explains differences in these abilities through the interaction of four cognitive systems, the exchange between which is influenced by situational and personality factors.

Of the four systems, two are responsible for handling input, i.e. the processing of experiences, while the other two systems are responsible for behavioural output, i.e. the planning and execution of actions. On the input side, the object recognition system (OR) identifies and distinguishes objects, while the extension memory system (EM) integrates and stores a large number of the person's experiences, which is why it is also called the *self-system* (Kuhl, 2008). On the output side, intention memory (IM) maintains difficult intentions, while the intuitive behaviour control system (IBC) provides the behavioural routines needed to translate intentions into actions (Kuhl, 2000, 2008).

According to PSI theory, each of the four cognitive systems processes information in a specific way (Kuhl, 2000). Intention memory—which is involved in conscious planning—processes information in a slow, sequential, and analytical way. Similarly, the object recognition system—which specializes in the detection of errors and novel stimuli—is characterized by analytical processing. In contrast to intention memory, however, it analyses incoming stimuli with respect to their features in the different modalities. Extension memory—which functions as a storage for integrated self-representations—processes

information in a fast, parallel, and holistic way. Similarly, the intuitive behaviour control system processes information holistically. However, it specializes in processing behavioural routines, which are contextualized in time and space (cf. Kuhl, 2001).

Differences in the self-regulatory functions mentioned above—like the selection and execution of self-congruent goals—are explained by changes in the relative activation of specific cognitive systems, which, in turn, determine the exchange of information between systems. The two input systems, object recognition and extension memory, as well as the two output systems, intuitive behaviour control and intention memory, are antagonistically related, i.e. they inhibit each other's activity. Therefore, at any given point in time, one of the systems is usually highly activated while the other system is deactivated (Kuhl, 2000, 2001).

According to the theory, self-regulatory functions become available when the unbalanced state of activation of the two systems becomes temporarily balanced (Kuhl, 2001). For instance, the mental system as a whole is either in a state of planning and inaction (high intention memory activity, low intuitive behavioural control activity), or in a state of acting (low intention memory activity, high intuitive behavioural control activity). The self-regulatory function of action initiation, for example, becomes available when the dominance of intention memory ceases in favour of a dominance of intuitive behaviour control. In the course of this transitional process, the two systems are, for a moment, in a similar state of activation, which, according to the theory, allows the transfer of the intention from intention memory to intuitive behaviour control, and thus action initiation (Kuhl, 2001).

Changes in the relative activation of systems depend on specific changes in affect (Kuhl, 2000, 2008). For instance, for an intention to be translated into action, inhibited positive affect must be released in order to transfer the intention from intention memory to intuitive behaviour control. To allow a novel or painful experience to be integrated into extension memory, high negative affect—if present—must decrease in order to transfer an experience from the object recognition system to extension memory, and enable its integration into the current network of self-representations (Kuhl, 2008).

In PSI theory, self-access is defined as the ability to retrieve integrated self-representations from extension memory. These self-representations include "needs,

feelings, body sensations, preferences, [and] values" (Kuhl, 2001, p. 151; own translation), based on which the self-congruence of a goal may be determined.

Measuring self-access according to PSI theory. PSI theory makes extensive use of memory-related concepts. Therefore it is not surprising that the theory measures self-access using a memory paradigm. The ability to distinguish goals set by oneself—i.e. originating in extension memory—from goals assigned by another person is used as an indicator of self-access.

Based on this idea, Kuhl and Kazén (1994) developed the so-called *self-infiltration* paradigm. Their subjects were asked to put themselves in the position of an office clerk and to plan their working day. They were given a list of 27 work-related activities[12] and asked to choose 9 of the activities for later execution. In addition, the experimenter assigned 9 activities to the subject. Following a distractor task, subjects were given an unexpected memory test. For each activity, they were asked to indicate whether they had previously chosen it, or whether it had been assigned by the experimenter, or both. Classifying a previously assigned activity as chosen was considered an indicator of self-access failure. Baumann and Kuhl (2003; Kazén, Baumann, & Kuhl, 2003) enhanced the paradigm by introducing computer-based assessment and by completely balancing item attractiveness, choice, and assignment.

From the perspective of memory psychology, self-infiltration is a measure of self-other distinction in an unexpected source memory test (cf. Johnson, Hashtroudi, & Lindsay, 1993). Here, only items that have been assigned exclusively are taken into account and only false-alarms regarding these items are counted. Thus, the self-infiltration measure is not a measure of general memory performance, nor of self-other distinction as such, but of a specific kind of self-other confusion.

Predicting self-infiltration. According to PSI theory, subjects under high negative affect suffer from self-access deficiencies. However, subjects scoring high on action orientation after failure (AOF; Kuhl, 1994), compared with low-AOF subjects, should be able to efficiently reduce negative affect (e.g., Koole & Jostmann, 2004). In other words, AOF should buffer the detrimental effects of negative affect on self-access. Data from correlational

(Baumann & Kuhl, 2003, Study 1) as well as experimental (Baumann & Kuhl, 2003, Study 2; Kazén et al., 2003, Studies 2 and 3) studies are in line with these predictions.[13] In a further study by Quirin, Koole, Baumann, Kazén, and Kuhl (2009), cortisol level, as well as change in cortisol level due to stress induction, predicted false self-ascription of assigned activities.[14]

Self-compatibility checking: A reaction-time measure of self-access. Computer-based self-access measurement (Baumann & Kuhl, 2003; Kazén et al., 2003) allowed reaction time data to be recorded and thus a reaction-time measure of self-access to be developed. Kazén et al. (2003) argued that self-access, in terms of testing whether a given goal is congruent with one's integrated self-representations, takes time. According to Kazén et al., this *self-compatibility checking* process comprises two steps: (1) accessing one's emotional preferences, and (2) accessing episodic memory about the activity's commitment status, i.e. about whether or not the activity has been selected as a goal. In the course of self-compatibility checking, a person may detect that he or she is committed to a subjectively unattractive activity, or that he or she is not committed to a subjectively attractive activity. In these cases, the person experiences a conflict between the two steps, i.e. a conflict between an activity's attractiveness and its commitment status. In the other cases—when an attractive activity has been chosen or an unattractive activity has not been chosen—no such conflict results.

When subjects decide whether or not they have chosen an activity, a conflict between the two above-mentioned steps leads to an increase in decision latencies. However, subjects with deficient self-access, i.e. state-oriented subjects under negative affect, should experience less conflict between preference and commitment status and therefore display a smaller increase in decision latencies due to incongruence of the two steps, compared with subjects with intact self-access.

Kazén et al. (2003) tested this hypothesis in three studies using the self-infiltration paradigm. In one study, self-other distinction regarding a number of mini-actions (e.g., clapping your hands, snapping your fingers) was measured. As expected, in action-oriented subjects, reaction times were prolonged in trials in which an unattractive activity was classified as chosen or an attractive activity was classified as not chosen. In state-oriented

subjects, no such pattern emerged. These results were confirmed in two additional studies. The role of the affective state remains unclear, however, as self-reported mood did not moderate the self-compatibility checking effect (Kazén et al., 2003, Study 3).

PSI theory's contribution to self-access research. Self-infiltration is one of the most widely used paradigms in PSI theory research. The paradigm and the aim of predicting self-access are central to the theory. The self-infiltration paradigm is unique in that it proposes non-self-report measures of self-access without falling back upon comparisons of goal versus motive content. Moreover, PSI theory has strongly contributed to self-access theory by coining self-access as a technical term. With respect to empirical support of self-infiltration effects, further replication of the central effects is clearly desirable.

A Dual-System Communication Framework

Four prominent models that are closely related to self-access in goal selection have been presented above: MDT, the IPM, the SCM, and PSI theory. In the following, we present a meta-theoretical framework, the *dual-system communication framework*, which encompasses the main ideas of the four self-access models. The framework serves as a means of comparing the different approaches with respect to hypotheses and methodology, and to derive ideas for future research.

The framework is introduced in two steps. In a first step, self-access is conceptualized as the communication between two memory systems, each of which serves a specific function and—in accordance with its function—is characterized by a specific mode of representing information. In a second step it is shown that the success of self-access depends on how appropriate the means of information processing is to the mode of information representation. In the following, we discuss how each of the self-access accounts discussed above relates to the assumptions of the dual-system communication framework.

Self-Access as Dual-System Communication

In this first step, we evaluate whether each of the four self-access accounts is compatible with the view that self-access is based on communication between two systems. Because

MDT and IPM are closely related, they are treated as variants of the same overarching theory in the following.

In recent accounts of motive congruence (Thrash et al., 2010), including the IPM (Schultheiss & Strasser, 2012), congruence between implicit motives and goals is thought to depend, at least partially, on self-access processes. According to these accounts, self-access is based on the interplay of two systems: an implicit motivational system, in which dispositional implicit motives are stored, and an explicit motivational system, in which self-attributed motives, as well as goals, are stored. In the context of this family of theories, congruence between the implicit and explicit motivation systems is taken to be an indicator of self-knowledge. Self-access processes, on which that self-knowledge is based, are thought to be processes of inter-system communication.

In motive congruence research, the most detailed account of self-access processes can be found in the IPM. According to this model, bi-directional translation between the two motivational systems is the main prerequisite for successful self-access. Self-access is possible if the dispositional knowledge stored in the implicit motivational system is made available to the explicit motivational system, i.e. to processes mediating the generation of self-attributed motives and the selection of goals.

Motive congruence theory has been translated into the vocabulary of PSI theory. Baumann et al. (2005) held that

> congruence between explicit and implicit motive measures is expected to occur when information can be exchanged between the two processing systems. More specifically, intention memory needs to “communicate” with extension memory in order to form valid representations of implicit needs in terms of self-congruence goals. (p. 782)

This self-access account is based on the assumption that goals are stored in intention memory, while implicit motives are stored in extension memory (Baumann et al., 2005, p. 782). It must be noted, though, that extension memory and intention memory of PSI theory are by no means synonymous with the implicit and explicit motivational systems, respectively, of MDT and IPM. For instance, extension memory serves to integrate novel experiences and

intention memory is thought to mediate planning processes (see Kuhl, 2001). These, however, are not assumed to be functions of the implicit and explicit motivational systems, according to the IPM.

While the self-access account of Baumann et al. (2005) echoes the conceptualization of self-access in MDT and IPM, a different account can be found in the self-infiltration literature (e.g. Baumann & Kuhl, 2003). In this alternative account, intention memory is not mentioned. Rather, self-access is explained entirely through extension memory processes: If a person has access to extension memory, then he or she "can choose goals that satisfy multiple constraints and easily feel priorities" (Baumann & Kuhl, 2003, p. 488). In other words, if extension memory can be accessed, a large number of aspects related to goal selection can simultaneously be taken into account. Thus, goal selection can be based on a larger amount of self-related information.

The self-infiltration account of PSI theory specifies the system containing evaluative dispositions (i.e. extension memory), but not the system responsible for conscious action regulation. Similarly, accounts of the SCM (e.g. Sheldon & Elliot, 1999) do not specify two interacting systems on which self-access is based. However, a more explicit specification of such systems—or levels—has recently been added to the model (Sheldon, 2004, 2008).

According to the SCM (Sheldon, 2002), self-access—i.e. self-concordance—concerns the question of "whether chosen goals are congruent or concordant with the person's deeper or true condition" (p. 68). Sheldon (2008) located self-concordance in a theory of multiple levels of personality. He defined self-concordance as the fit between the goal level—which is contextualized in time, place, and/or role—, and the—decontextualized—"organismic and trait levels" of personality (p. 468). The process of aligning the contextualized with the decontextualized levels of personality is described as self-perception, i.e. the perception of the trait levels during goal selection. While self-perception may be assumed to include communication between mental systems—i.e. between a system that perceives, and another system that is being perceived—, dual-system communication is not made explicit in the self-concordance model.

In sum, in each of the self-access theories discussed so far, the distinction of two

systems, or levels, plays a major role in the conceptualization of self-access. One exception is explanations of self-infiltration, which do not explicitly rely on a dual-system model. According to theories of motive congruence—be they rooted in motive disposition theory or PSI theory—communication between an implicit and an explicit system mediates self-access. In SCM, such a communication is not explicitly mentioned but may implicitly be assumed.

As we have just shown, in most models of self-access in goal selection, communication between dual systems is assumed to underlie self-access. Next, the theories are compared with respect to the question of the conditions under which inter-system communication—and thus self-access—is enhanced or impaired.

Conditions for Inter-System Communication

Of the self-access models discussed above, PSI theory and the IPM specify the conditions under which communication between systems is facilitated or hindered, while the SCM does not[15]. Therefore, only PSI theory and the IPM are considered in the following.

According to Baumann et al. (2005), "chronic inhibition of positive affect (frustration) and/or chronic activation of negative affect (anxiety)" (p. 782) disturb the communication process between intention memory and extension memory. This double hypothesis is based on four assumptions. Firstly, intention memory and extension memory are antagonistically related (Kuhl, 2000), i.e., extension memory suppresses intention memory activity, and vice versa. Secondly, an inhibition of positive affect activates intention memory, and consequently inhibits extension memory and thus access to implicit needs. Thirdly, high negative affect directly inhibits extension memory. From the fourth assumption, that extension memory needs to be activated in order to communicate with intention memory, it follows that low positive affect or high negative affect are detrimental to self-access. In other words, the communication between explicit intentions and implicit self-representations is hindered when a person is chronically frustrated—i.e. when he or she focuses on previous failures—, or when a person is anxious—i.e. when he or she is preoccupied with possible future failures. According to PSI theory, both conditions make it less likely that a person can successfully access his or her implicit self-representations, including needs, preferences, and values.

In contrast to PSI theory, the IPM does not assume that inter-system communication depends on the (relative) activation of the implicit and the explicit system. Rather, as mentioned above, Schultheiss and Strasser (2012) propose that referential processing converts information from the implicit—i.e. nonverbal—system into an explicit—i.e. verbal—format, and vice versa. According to the IPM, these conversion processes are a prerequisite for self-access.

At first glance, PSI theory and the IPM disagree about the processes thought to underlie such communication. However, they may not be as contradictory as it seems. The personality systems in PSI theory differ in their information processing modes: Intention memory processes information in a sequential and analytical fashion, while extension memory processes information in a parallel and holistic fashion (Kuhl, 2000, 2001). These processing modes correspond to the way in which information is stored in each of the two systems: In extension memory, self-aspects are stored in parallel distributed networks (Kuhl, 2001, p. 152), while in intention memory, planned actions are stored in an abstract symbolic representation format (p. 147), which is closely related to language (p. 158). Thus, the processing characteristics of intention memory and extension memory correspond to the representation format of memory content in each system: Parallel distributed networks require parallel processing, symbolically represented goals require sequential processing. Self-access is possible when parallel, holistic, and intuitive processing is available in the cognitive system as a whole, which allows access to a person's implicit needs and preferences stored in the distributed networks of extension memory. Besides self-representations being accessible in extension memory, they need to be transferred to intention memory so that a goal can be selected that is well-aligned to implicit self-representations.

If the relationship between intention memory and extension memory is interpreted in this fashion, the IPM agrees with PSI theory regarding two aspects. Firstly, the explicit system (or intention memory) represents information verbally and symbolically to a larger extent than the implicit system (or extension memory). Secondly, for a system to be accessed, a cognitive mode must be available that is appropriate to the implicit system's mode of information representation.

IPM goes beyond PSI theory in that a bi-directional flow of information is assumed. Not only must implicit motives be translated into explicit goals or motives, but also vice versa. Therefore, according to the IMP—the implicit system may be ignorant of the person's current, explicitly held goals and motives, which may result in a failure to align the explicit motivational system with the implicit motivational system.

Summary of the Dual-System Communication Framework

In sum, models of self-access in goal selection are compatible with the view that self-access depends on successful communication between two systems. While MDT (McClelland, 1985) and the IPM (Schultheiss & Strasser, 2012) are explicit dual-system models, the SCM (Sheldon, 2002) and PSI theory (Kuhl, 2000) include duality assumptions in more implicit ways. The self-access account of SDT (Sheldon, 2002) may be interpreted in terms of a duality of the goal level on the one hand, and underlying personality and organismic levels on the other hand. In PSI theory (Kuhl, 2000), a duality assumption is made with respect to the antagonism of intention and extension memory.

Dual-system communication may be regarded as the lowest common denominator of models of self-access in goal selection. Exemplars of this category of models are in line with three assumptions. Firstly, evaluations of future actions—or classes of future actions—may be represented by an implicit, as well as an explicit system, where the implicit system holds evaluative dispositions, while the explicit system is responsible for the conscious control of action. Secondly, implicit evaluations of future actions may be transferred from the implicit to the explicit system under certain conditions, so that they may influence conscious reports and conscious action control. Thirdly, inter-system communication—and thus self-access—is possible if a certain mode of cognitive processing is available in the mental system.

According to PSI theory (Kuhl, 2000) and the IPM (Schultheiss & Strasser, 2012), inter-system communication—and thus self-access—succeeds when a mode of processing is available that fits the representation format of the stored information, i.e. when distributed, non-verbal information in the implicit system can be processed holistically and in parallel, and when verbal information in the explicit system can be processed analytically and sequentially.

According to the IPM, the appropriateness of the processing mode is not sufficient for self-access. Rather, self-access depends on a bi-directional translation of memory contents. Figure 1 depicts the dual-system communication framework. The bold arrows represent the, more commonly hypothesized, transfer from the implicit to the explicit system. The dashed arrows represent the transfer of information in the opposite direction, which is an assumption unique to the IPM (Schultheiss & Strasser, 2012).

Insert Figure 1 about here

Theories and Measures of Self-Access in Goal Selection Classified

After discussing the common features of models of self-access in goal selection in the previous sections, the following section serves the purpose of determining the criteria according to which the models, and the respective self-access measures, may be classified. We propose two such criteria: level of analysis and consideration of interpersonal processes.

Level of Analysis

The concept of self-access is based on the idea of one mental entity gaining access to contents stored inside a second mental entity. The self-access models presented above differ with respect to how closely their theoretical assumptions and measurement techniques match the concept of self-access in its full form. We label these differences *level of analysis*.

A high level of analysis exists when the processes involved in decoding self-relevant information stored in memory are postulated theoretically, and such processes are either measured or manipulated. On a medium level of analysis, only the results of the self-access processes are considered, but not the self-access processes themselves. These results may be considered instances of *self-knowledge*[16], often conceptualized as a fit between explicit motivation (e.g. goals) and some objective, or dispositional reference value. A low level of analysis is purely phenomenological and includes exclusively subjective self-access constructs, e.g. identity diffusion or perceived lack of self-access.

Most self-access models discussed above—namely the IPM, the SCM, and PSI theory—include a hypothesis of individual differences in self-access, i.e. in the ability to select

goals in accordance with some kind of subconscious or implicit disposition. Thus models of self-access in goal selection are, from a theoretical perspective, situated on a high level of analysis. According to these models, differences in self-access are attributed to differences in the availability of evaluative dispositions that are generally not consciously accessible.

While self-access processes are almost unanimously postulated theoretically, the ways of measuring the critical construct vary greatly between the different approaches. Self-access measurement according to the SCM (Sheldon, 2002) using the PLOC is characterized by a low level of analysis. Whether the perceived locus of causality is perceived as more internal or external, is an exclusively subjective measure from which no inferences may be drawn about the accuracy of the subject's beliefs.

Fit measures, situated on a medium level of analysis, are put forward by MDT (Brunstein, 2010) and PSI theory (e.g. Baumann & Kuhl, 2003). Both motive-goal congruence and self-infiltration are measures of the fit between a subjective report about a goal, and an objective—i.e. non-self-report—measure that serves as a touchstone for the inference of congruence. In the case of motive-goal congruence, the evaluation of a goal is compared with the projectively measured evaluation of a corresponding class of incentives, e.g. achievement incentives. In the case of self-infiltration, the subjective belief about an activity's intention status is compared with its objective intention status, namely whether or not it has been previously chosen by the subject.

In the goal-imagery as well as the self-infiltration paradigms, self-access processes are directly manipulated or measured: in the goal imagery studies, in which referential processing is manipulated (e.g. Schultheiss & Brunstein, 2002), and in the self-compatibility checking measure within the self-infiltration paradigm (Kazén et al., 2003). In the former, self-access—in terms of inter-system communication—is facilitated by stimulating the cross-modal translation of goal-related information. In the latter, conflict between activated preferences—presumably a result of successful self-access—and an activity's intention status, resulting in prolonged decision latencies, is measured. These two paradigms are the most direct ways of operationalizing self-access that are currently available.

Consideration of Interpersonal Processes

A goal may either be self-set, or assigned by others (e.g. employers or parents; Oettingen & Gollwitzer, 2004, p. 167), which has implications for the research questions typically asked. In the case of self-selected goals, the prominent question is how goals are selected on the basis of a person's needs, which interact with the incentives present in the situation (Gollwitzer, Kappes, & Oettingen, 2012). In the case of assigned goals, by contrast, the prominent question is how the goals interact with the person's current goals, and how well they are accepted as personal goals (Oettingen & Gollwitzer, 2004). Models for self-set goals focus on intrapersonal processes that occur when a difficult decision needs to be taken. In contrast to this, models for goals that are assigned by others focus on interpersonal processes that are the result of social influence, with which the actor may cope in different ways. Self-access models differ with respect to the question of whether self-access is thought to be primarily based on intrapersonal or interpersonal (i.e. social) processes.

From a theoretical perspective, motive congruence research in MDT (McClelland et al., 1989) and PSI theory (Baumann et al., 2005) focuses on intrapersonal determinants of self-access. According to these models, whether self-access succeeds depends on a person's ability to base the selection of goals in a given situation on his or her own dispositions.

A second class of goal-selection models, by contrast, focuses on interpersonal processes, in that they address the dichotomy—or conflict—between a subject's internal dispositions, on the one hand, and external assignments, expectations, or norms, on the other hand. One such model is self-determination theory (Ryan & Deci, 2000), which includes the assumption that goals originating externally—e.g. a teacher's assigment, or social norms—may be internalized and integrated into the self. While the SCM (Sheldon, 2002, 2008), in theory, explains self-access pre-eminently through self-perception processes, the self-access measure used in this area of research is based on the notion of a conflict between self- and other-generated motivation, namely on the PLOC. Thus, from a methodological point-of-view, the SCM suggests that self-access is related to interindividual processes.

Similarly, PSI theory (Kuhl, 2000) as such does not model interindividual processes, because social influences on goal selection are not represented by any of the four cognitive

systems. However, interindividual processes are included in the self-access measure derived from PSI theory, namely self-infiltration (Kuhl & Kazén, 1994). In this paradigm, goals are distinguished according to their internal versus external origin. Specific mistakes in the memory representation of this dichotomy—i.e. false self-ascription of assigned activities, or false internalization—indicate self-access deficiencies.

On closer examination, the self-access paradigms of SCM and PSI theory have more in common than the inclusion of an external source of goals and corresponding interpersonal processes. They are based on theories of internalization (see Schafer, 1968), i.e. on theories about the incorporation of external regulations into the person. For example, the emotion of shame may be regarded as a result of the internalization of external punishments upon making a mistake. In what way does internalization relate to self-access? SCM and PSI theory have different views about this question. The PLOC measurement used by the SCM suggests that reporting a high internalization—i.e. integration—of goals indicates good self-access; self-infiltration research, by contrast, uses internalization as an indicator of self-access deficiencies. Thus, a non-internalized goal representation indicates good self-access according to PSI theory, but bad self-access according to the SCM.[17]

A 3×2 classification scheme. In the preceding sections, it was proposed that self-access paradigms can be classified according to two criteria: level of analysis and consideration of interpersonal processes. Paradigms can, firstly, be distinguished according to the level of analysis on which the corresponding self-access measures are situated. Of the three levels, the first is phenomenological, the second includes a concept of fit, and the third addresses self-access processes directly by measuring or manipulating them. Secondly, paradigms of self-access in goal selection may be classified according to the question of whether interpersonal processes are included in the theory and/or measurements. As it turned out, paradigms that involve interpersonal processes are, more precisely, paradigms that include a concept of internalization of externally originating goals. In sum, measures of self-access in goal selection may be classified according to a 3×2 scheme (Table 1).

Insert Table 1 about here

Self-Access in Decision-Making: Convergence with Self-Access in Goal Selection?

As shown above, a variety of self-access models exist in the domain of goal selection. These models are linked to motivational concepts like needs and the energization of behaviour, and to social-psychological concepts like the internalization of external demands. However, processes of choice have not only been researched in social psychology and the psychology of motivation, but also in the field of decision-making. Like motivation and social psychologists, decision theorists have been interested in the question how well choices fit a person, and on what processes such a fit is based. Thus, the phenomenon of self-access has been discussed in decision-making research, albeit less explicitly and less extensively than in other subdisciplines of psychology.

The following section discusses models and paradigms of self-access in decision-making. The current research may profit in two respects from the inclusion of decision-making models. Firstly, whether models of self-access in decision-making converge with models of self-access in goal selection may prove fruitful for an overarching model of self-access. Secondly, self-access measures from the decision-making domain may be transferred to goal-selection research and expand the methodological possibilities in self-access research.

In the following, we consider the similarities and differences between the related concepts of goal selection and decision-making. Subsequently, we give an overview of two prominent concepts in models of decision-making: the concepts of rationality and duality. Finally, we present selected models of self-access in decision-making, along with their respective paradigms, in order to discuss the relationship between these paradigms and the dual-system communication framework.

Goal Selection and Decision-Making

As mentioned above, goal selection refers to the act of transforming some, but not other, wishes into binding goals, which is the result of "deliberating the positive and negative potential consequences of . . . action alternatives" (Achtziger & Gollwitzer, 2008, p. 273). Similarly, making decisions may be defined as "choices among acts that cause desirable or

undesirable consequences when performed in various states of the world" (Joyce, 2005, p. 655). At first glance, the two definitions seem interchangeable, as both denote the choice of an action from a larger set of possible actions. A closer look, however, reveals important differences.

Firstly, the two concepts stem from different theoretical traditions. Goal selection originates in the psychology of motivation, which is characterized by the assumption of prominent affect-based antecedents of goal selection, which are conceptualized as personality variables, e.g. implicit motives. Decision-making, by contrast, is generally concerned with cognitive information processing, i.e. with the way in which action preferences are derived from the utility of expected action outcomes (Joyce, 2005). Affective (e.g. Slovic, Finucane, Peters, & MacGregor, 2007) or personality-oriented (e.g. Appelt, Milch, Handgraaf, & Weber, 2011) views of decision-making have not been of major importance to this field of research and have only recently begun to attract attention. Secondly, the research questions regarding choice are different in the two traditions. While decision-making research is mostly limited to antecedent processes of choice, goal selection research concerns, in addition, the consequences of making certain choices for action initiation, performance, and well-being. Thirdly, in the typical decision problem, the set of options from which one is to be chosen is given and known to the subject, while in goal selection research, a theoretically unlimited number of possible goals is assumed.

In sum, decision-making theory is a theory of cognitive information processing and focuses on the antecedent processes of choice from a, typically, limited set of options. Goal-selection theory, by contrast, is rooted in a theory of individual differences in affectively based traits, and focuses on the consequences of choices from a theoretically unlimited set of options.

Rationality and Duality: Two Prominent Concepts in Theories of Decision-Making

Theories of decision-making deal with outcomes, i.e. criteria about whether a decision's consequences are good or bad for the decision-maker, and processes, i.e. the mental activities leading to a decision. *Rationality*, on the one hand, has been used as an outcome criterion of

decisions in various lines of research (e.g. Evans, Over, & Manktelow, 1993). The processing antecedent to a decision, by contrast, has often been conceptualized in terms of *duality*, i.e. a broad distinction between two modes of processing (e.g. Smith & DeCoster, 2000).

Duality models may either be formulated as dual-processing or dual-system models. Both alternatives assume distinctive differences in processing. Dual-system models make the additional assumption of two distinct entities on which dual-processing is based. Thus, dual-system models are dual-processing models, but not vice versa. In the following, when we refer to a duality model, this means a dual-processing model that may or may not include a dual-system assumption.

Rationality in Decision-Making. Authors from the field of game theory have proposed that decision-makers should maximize the subjective expected utility (SEU) by adhering to certain axioms (von Neumann & Morgenstern, 1944, as cited in Hayashi, 2008; cf. Savage, 1972). For instance, the axiom of independence says that, if a decision-maker prefers option p to option q, then adding the same value (weighted with the same expectancy) r to both options should leave the preference intact, because it does not affect the utility relationship between p and q (Hayashi, 2008). The postulate that people conform to axioms like the independence axiom has been met with early criticism in economic theory (Allais, 1953; Ellsberg, 1961). Allais (1953), for example, held that people systematically violate the axiom of independence, a phenomenon known as the *Allais paradox*.

Simon (1955) criticized the approach of game theory to decision-making on a more fundamental level. He argued that classical theories of rationality assume that the *economic man* has a knowledge of the outcomes (*pay-offs*) of all relevant options, has a knowledge of the probability of each outcome and is able to make complex calculations to find the optimal option. According to Simon (1955), this view is neither suitable for a normative nor a descriptive account of decision-making, as psychological research shows that the human mind is limited with respect to knowledge and information processing capabilities. In other words, rationality is *bounded* (Simon, 1972), which is why decision-makers often do not choose the normatively optimal option but the first satisfying option they consider (so-called *satisficing*). Using computer simulations, Gigerenzer and Goldstein (1996) showed that judgements under

the constraints of bounded rationality may be as effective as judgements based on exhaustive information processing. So-called *one-reason decision-making*—e.g. the Take The Best heuristic—leads to the same proportion of correct inferences as complex algorithms like multiple regression. This conclusion is in line with conclusions drawn by Tversky and Kahneman (1974) who, despite focusing on biases resulting from using heuristics, hold that such simplified decision algorithms "are highly economical and usually effective" (p. 1131). In sum, researchers interested in a psychologically plausible (Gigerenzer, 2001) description of judgement and decision-making refrain from assuming an exhaustive processing of information in the derivation of judgements or decisions.

According to a contemporary view of rationality, a behaviour—or the mental states and processes on which it is based—is rational if it leads to the achievement of given goals (Over, 2004; Simon, 1972). Thus, in contemporary theories of rationality—in contrast to classical decision theory—maximizing subjective expected utility is not assumed to be the goal people strive for exclusively. Rather, the achievement of ideographic goals is the rationality criterion.

Duality models in decision-making. Duality models are common in psychology (for reviews, see Deutsch & Strack, 2006; Evans, 2008; Gawronski & Creighton, in press; Smith & DeCoster, 2000). They are based on the assumption that there are two fundamentally distinct modes of cognitive processing, the choice between which has an impact on the way in which objects are evaluated and decisions are made. Evans (2008), who reviewed dual-system accounts in cognitive and social psychology, stated that different labels for the two systems abound and proposed using the terms *System 1* and *System 2 processes* (e.g. Kahneman, 2003). According to Evans (2008), most duality theorists agree that System 1 processes are "unconscious, rapid, automatic, and high capacity", and System 2 processes are "conscious, slow, and deliberative" (p. 256). Furthermore, some theorists assume that System 1 processes are older in evolutionary terms, less language-based, more contextualized, and more universal than System 2 processes, to name a few examples (Evans, 2008).

With respect to judgement and decision-making, the question arises, whether System 1 or System 2 processing leads to better decisions—e.g. in terms of compliance with axioms of rational choice. According to some theorists, System 1 processing is a source of errors and

biases (e.g. Petty & Wegener, 1999; Tversky & Kahneman, 1974). Other theorists, by contrast, held that System 1 processing leads to better decisions. Dijksterhuis and Nordgren (2006), for example, took the position that unconscious thought leads to better decisions than conscious thought. Similarly, intuitive processing is often thought to be more effective than more conscious and deliberative processing (for a summary, see Betsch & Glöckner, 2010).

Paradigms for Measuring Self-Access in Decision-Making

As in the goal-selection models discussed above, self-access is also an issue in models of decision-making. In decision-making, self-access is defined as processes that enhance the fit between choices and underlying preferences. Whether these preferences are to be conceptualized as relatively stable dispositions is more controversial in decision-making than in goal-selection research.

Two paradigms of self-access in decision-making are discussed in the following: the paradigm linking dual-processing to preference consistency (e.g. Lee, Amir, & Ariely, 2009) and the paradigm linking the processing of somatic markers to performance in the Iowa Gambling Task (Damasio, Tranel, & Damasio, 1990). These paradigms have been chosen, firstly, because they make explicit self-access assumptions and, secondly, because they appear to be consistent with a dual-processing account. The preference consistency account discussed next differs most markedly from goal-selection accounts in that measures of self-access are explicitly derived from axioms of rational choice.

Duality and preference consistency. An axiom of classical decision theory says that a decision-maker, when making repeated judgements or decisions about the same objects, should show the same absolute and relative preference for each judgement or decision. In other words, judgements or decisions should not contradict earlier judgements or decisions. This requirement has been formalized in theories of rational choice as the *transitivity of preferences* (e.g. Tversky, 1969). According to the transitivity axiom, if object *A* is preferred to object *B* and, furthermore, object *B* is preferred to object *C*, then object *A* should be preferred to object *C*. If, however, the decision-maker prefers object *C* to object *A*, this preference is regarded as a violation of the transitivity axiom.

In their review of preference transitivity research, Regenwetter, Dana, and Davis-Stober (2011) noted that most researchers had concluded from empirical data that humans and other animals violate the transitivity axiom. The authors showed, however, that it cannot be readily concluded from transitivity violations in overt choice behaviour that the latent preferences are intransitive as well. Thus, when behaviour is stochastically modelled, Regenwetter et al. held that no evidence for intransitivity can be found in empirical data. Studies by Birnbaum and Schmidt (2008, 2010) have confirmed this view.[18]

Only a small number of studies have treated preference consistency as an individual difference variable and tested whether preference consistency depends on people's states or traits (Lee et al., 2009; Nordgren & Dijksterhuis, 2009; Riechard, 1991). The studies by Lee et al. (2009) and Nordgren and Dijksterhuis (2009) are of particular interest to the current research, as they explain preference consistency using duality accounts.

Lee et al. (2009) used transitivity as a measure of preference consistency. Based on a dual-system account, the authors expected participants to be more consistent when information processing was more emotion-based, compared with more cognition-based processing. In four experimental studies, participants made pairwise preference comparisons between products (e.g. a voice recording pen, or an LED clip light). Stimulus features (pictures versus words; colour versus black-and-white pictures) and processing features (trust in feelings; cognitive capacity) were manipulated. As expected, subjects were more consistent when emotional processing was facilitated, i.e. when judging pictures (versus words), colour (versus black-and-white) pictures, when trust in feelings was high, or when cognitive capacity was limited by a secondary task. According to Lee et al., these results may be due to the emotional system being "better attuned to consistently and reliably provide individuals with a reading of their preferences" (p. 175) and "one's emotional responses" being "very valuable in understanding one's inherent preferences" (p. 185; cf. Simonson, 2008). Thus, their data are in line with a self-access account.

Using a related paradigm, Nordgren and Dijksterhuis (2009) examined whether the consistency of preferences depended on processing style. In five experiments, their participants rated the attractiveness of various objects—e.g. Chinese ideograms, paintings,

jelly beans—both at the beginning and the end of a 50-minute period. The stability of preference ratings served as an indicator of preference consistency. Nordgren and Dijksterhuis hypothesized that the more deliberatively information is processed when making judgements, the less consistent the judgements should be. Subjects' processing mode was manipulated by instructing them to make judgements either in a deliberative manner, i.e. by thinking "very hard", or in a nondeliberative manner, i.e. "based on a gut feeling" (p. 40). As expected, subjects who made judgements more deliberatively were less consistent in their judgements than subjects making nondeliberative judgements. This was especially true when stimuli were complex, i.e. described by many features. Results indicate that deliberation hinders preference consistency, while nondeliberation does not increase consistency compared with a control condition. Nordgren and Dijksterhuis argued that deliberation "introduces decisional noise by poor and unsystematic weighting" (p. 40) of object attributes.

Compared with Lee et al. (2009), these authors employed a merely implicit duality model: They assumed two distinct processes but did not specify the (System 1) process that is disrupted by the deliberative (i.e. System 2) process. However, the results of Nordgren and Dijksterhuis do not contradict the view that System 1 processing supports access to implicit preference dispositions, which leads to more reliable preference judgements, and that System 2 processing is disruptive to this System 1-based self-access.

In sum, the results of Lee et al. (2009) and Nordgren and Dijksterhuis (2009) are in line with the idea that self-access in judgement and decision-making is supported by System 1, and hindered by System 2 processes. It must be admitted, though, that this research did not tap into self-access processes themselves, but only into their assumed results. The somatic markers and the Iowa Gambling Task discussed in the following, by contrast, claim to represent more direct measures of self-access processes.

Somatic markers and the Iowa Gambling Task. In 1985, Eslinger and Damasio described a neurological patient, EVR, with specific behavioural anomalies following a brain tumour and corresponding surgery in the frontal lobes. The patient scored on or above average on a number of cognitive tests, including intelligence scales and tests of frontal lobe function (e.g., the Wisconsin Card Sorting Test, WCST). EVR's real-life behaviour, by contrast, was

characterized by bankruptcy, an inability to keep a stable job, and broken marriages. Eslinger and Damasio (1985) classified EVR's behaviour as "sociopathic" (p. 1734). The dissociation between cognitive and social functioning laid the foundations for a new neuroscientific theory of decision-making.

Bechara, Damasio, Damasio, and Anderson (1994) developed a laboratory task on which EVR, and similar patients, behaved markedly differently from other neurological patients or normal controls. This so-called Iowa Gambling Task (IGT) is a serial decision-making task, in which subjects pursue the goal of maximizing their monetary assets. Initially, subjects are provided with $ 2000 in facsimile banknotes. They are then asked to choose repeatedly from one of four decks of cards, A, B, C, or D. Each choice results either in a reward, or in a combination of reward and punishment. The four decks differ with respect to reward and punishment schedules. Each choice from decks A or B results in a $ 100 gain, while a choice from decks C or D results in a gain of only $ 50. Through occasional punishments, subjects lose $ 1200 per 10 cards from decks A or B, but they lose only $ 250 per 10 cards from decks C or D. A preference for decks A or B results in a net loss, while a preference for decks C and D results in a net gain. Therefore, decks A and B are disadvantageous, while decks C and D are advantageous. The task ends after 100 draws. Subjects are not informed about the reward and punishment schedules or the number of cards they are required to draw to complete the task.

Patients like EVR, who have lesions in the ventromedial prefrontal cortex (vmPFC), perform markedly worse on the Iowa Gambling Task than normal subjects (Bechara et al., 1994). While normal subjects develop a preference for the advantageous decks after a short exploratory phase, vmPFC patients never stop drawing from the disadvantageous decks. Thus, unlike control subjects, vmPFC patients do not learn from experience that the relatively high rewards in decks A and B do not outweigh the infrequent, but relatively high punishments in the same decks.

According to Bechara et al. (1994), these results may indicate that, in vmPFC patients, cognitive scenarios (e.g. the act of drawing from a particular deck) are not "*marked* with a . . . value" (p. 14, emphasis in original). Moreover, the *somatic marker hypothesis* (SMH) says

that this marking of a cognitive scenario is mediated through the "overt or covert processing of somatic states" (Bechara et al., 1994, p. 14). In other words, somatic changes[19]—be they conscious or unconscious—indicate to the normal subject that a certain option is good or bad overall. According to this hypothesis, such a process does not take place in vmPFC patients.

A study by Bechara, Tranel, Damasio, and Damasio (1996), which used the skin conductance response (SCR) as an indicator of somatic changes, is in line with the SMH. In this study, the SCR was measured over a period preceding, as well as a period following the drawing of each card. Both vmPFC patients and healthy controls generated SCRs after being rewarded or punished. In addition, control subjects developed SCRs before drawing certain cards. These SCRs, which are interpreted as anticipatory SCRs, were stronger before drawing from decks A and B, compared with decks C and D. Such anticipatory SCRs, however, were entirely absent in vmPFC patients. Bechara et al. (1996) concluded that somatic changes may help normal subjects to make advantageous decisions, and that vmPFC patients choose disadvantageously because they lack such somatic changes.

Die SMH assumes that somatic markers may be processed outside the individual's awareness. To corroborate this assumption, Bechara, Damasio, Tranel, and Damasio (1997) collected self-report data during the Iowa Gambling Task by asking subjects to tell the experimenter "all you know about what is going on in this game" and how they felt about the game (Bechara et al., 1997, p. 1293). Based on oral responses, as well as SCR data from vmPFC subjects and normal controls, four task periods were distinguished. The period before punishments[20] were made and in which no anticipatory SCRs were observed was called the *pre-punishment* period. When a number of punishments had been experienced, normal subjects developed anticipatory SCRs, while the same subjects were entirely unable to specify any rules or regularities in the task. Therefore, this second period was called the *pre-hunch* period. In the third, the *hunch* period, all normal subjects expressed a hunch about decks A and B being less advantageous, and all normal subjects showed anticipatory SCRs before drawing from these same decks. None of the patients, by contrast, had a hunch or anticipatory SCRs. In time, subjects gained explicit knowledge about the nature of the task. The period, in which subjects were able to tell why decks A and B were disadvantageous, was called the

conceptual period. Both some of the patients and some of the normal controls reached the this fourth period. Interestingly, even those vmPFC patients who were able to indicate which decks were disadvantageous did not develop a preference for choosing from the advantageous decks.

Based on these results, Bechara et al. (1997) proposed a model of decision-making which features two classes of processes that are antecedents to a decision: Firstly, "nondeclarative dispositional knowledge related to the individual's previous emotional experience with similar situations" (p. 1294) are evoked. Secondly, facts about action-outcome contingencies are consciously processed and subjected to reasoning strategies. Bechara et al. (1997) concluded from their data that, in normal subjects, nondeclarative processing precedes declarative processing of facts and biases the reasoning process on which a decision is based. This biasing, Bechara et al. (1997) believe, makes the decision-maker avoid dangerous options. Furthermore, SCRs are assumed to reflect "access to records of previous individual experience" (Bechara et al., 1997, p. 1294). In sum, the SMH may be considered a duality account of self-access as it features the distinction between two types of knowledge, one nondeclarative, one declarative. The relative contribution of these types of knowledge determines the extent to which previous experience is taken into account when the decision is made.

The empirical status of the SMH is controversial (for a review of critical accounts, see Dunn, Dalgleish, & Lawrence, 2006). For instance, it has been shown that subjects who choose advantageously have a conscious knowledge of which decks are advantageous (Maia & McClelland, 2004). This calls into question the assumption that unconscious biases help decision-making in normal subjects. Furthermore, subjects with impaired feedback from the body—i.e. patients with pure autonomic failure (PAF) or spinal cord injuries—did not perform worse on the Iowa Gambling Task than normal subjects in most studies (e.g. Heims, Critchley, Dolan, Mathias, & Cipolotti, 2004). Dunn et al. (2006) concluded that the main aspects of the SMH are most likely false: Data do not support the notion that the Iowa Gambling Task measures learning of contingencies based on anticipatory, peripheral marker signals.

Duality, rationality, and self-access in decision-making. The preference consistency paradigm, as well as research on somatic markers share the idea that the quality of decisions is

enhanced by processes described as emotional, non-deliberative, or somatic. This class of processes can be identified with System 1 processes, as defined in dual-processing models. In this vein, the models of self-access in decision-making discussed above may be considered duality models.

The criterion for judging decision quality differs between preference consistency and somatic marker research. In the preference consistency studies discussed above, compliance with axioms of rational choice theory is taken to indicate higher decision quality: Decisions that are more transitive or more temporally stable are thought to be better realizations of the decision-maker's disposition. Here, compliance with axioms of rational choice is considered an indicator of self-access.

In somatic marker research, by contrast, subjects choosing from disadvantageous decks in the Iowa Gambling Task do not violate axioms of rational choice. Even though their experience may suggest an advantage of some, compared with other decks, they cannot reasonably make any prediction about the value of future cards. Nevertheless, subjects who persistently draw from disadvantageous decks are thought to suffer from decision-making deficiencies. Here a different variant of rationality is the touchstone for decision quality: Choosing from advantageous decks is rational in that it serves the subject's current goal of making a profit. Thus, in the context of the SMH, rationality is not defined in terms of compliance with axioms, but with the achievement of personal, or idiographic, goals (see the rationality concepts of Simon, 1972, and Over, 2004, discussed above).

Self-Access in Decision-Making and the Dual-System Communication Framework

According to the dual-system communication framework, evaluative dispositions which are stored in an implicit system may become available for conscious report or action control through a transfer of information from the implicit to an explicit mental system. In the following, two questions regarding the relationship between self-access in decision-making and the dual-system communication framework are discussed: firstly, the question of whether models of self-access in decision-making fit into the dual-system communication framework; secondly, what consequences the consideration of decision-making models has for the

framework.

Models of self-access in decision-making as dual-system communication models. Do the two decision-making accounts discussed above fit into a dual-system communication framework? Both accounts include the idea of process-dependent access to self-related information: According to both Lee et al. (2009) and Bechara et al. (1997), System 1 processing—emotional or somatic, respectively—fosters access to dispositional evaluative knowledge. This kind of access, in turn, helps to make decisions more rational or advantageous.

However, these accounts differ from dual-system communication models in the domain of self-access in goal selection in that, even though they mention one system in which dispositional evaluative knowledge is stored, they do not explicitly mention a second system which might access this stored knowledge. Thus, theories of self-access in decision-making may be considered incompletely specified dual-system communication models, which do not, however, contradict the dual-system communication framework.

Models of self-access in decision-making differ with respect to their level of analysis. The preference consistency approach is merely concerned with the assumed outcomes of self-access processes and therefore situated on a medium level of analysis. SMH research, by contrast, explicitly tests a proposed mechanism of self-access—i.e. somatic markers—and is therefore situated on a high level of analysis. Models on a low level of analysis are uncommon in research on self-access in decision-making, because models usually include an objective measure of self-access outcomes or processes.

The models of self-access in decision-making discussed above do not differ with respect to the consideration of interpersonal processes. None of the models consider coping with external demands or other-assigned goals.[21] In this respect, they are similar to MDT and IPM, but dissimilar to the SCM and PSI theory.

Considering decision-making: Consequences for the dual-system communication framework. As shown above, self-access models for goal selection and decision-making are similar in several respects. This leads to the question whether the dual-system communication framework could be generalized to more seamlessly include self-access models of

decision-making.

In the decision-making domain, duality of processes or systems is a characteristic feature of self-access models. As discussed above, these duality models feature a distinction between two systems, System 1 and 2, and their respective processes. The implicit and the explicit system in the dual-system communication framework may be considered instances of System 1 and 2, respectively, as defined in duality models. Like System 1, the implicit system is thought to process information unconsciously and automatically, while, like System 2, the explicit system is thought to process information consciously and deliberatively. Thus, the dual-system communication framework is a duality model.

However, duality is a general notion, of which dual-system communication is a specific instance. Therefore, some features apply to dual-system communication that do not apply to duality in general. Firstly, while duality may denote duality of processing, or systems, or both, the dual-system communication framework features two systems that are, in addition, defined as long-term memory systems. Memory contents in the two systems differ in their mode of representation. Moreover, retrieval of memory contents succeeds if a type of cognitive processing is available that fits the memory contents. For instance, retrieval of non-verbally encoded implicit self-representation stored in distributed networks succeeds if holistic, intuitive processing is available, but fails if processing is restricted to de-contextualized, sequential, limited-capacity processing.

Thus, duality in the dual-system communication framework is present on two levels: on the level of the representation mode and on the level of the processing mode. Systems and processes in the dual-system communication framework may therefore be renamed using the Type 1 versus Type 2 distinction known from duality models. This results in a distinction between Type 1 and Type 2 processes which operate on the contents of Type 1 and Type 2 systems, i.e. System 1 and System 2. Figure 2 illustrates the relationship between the dual-system communication framework—in which the processes and systems have been renamed—and theories of self-access in decision-making (which, as mentioned above, generally lack a specification of System 2).

Insert Figure 2 about here

Dual-System Communication: A Framework for Future Research

In the current article, we have proposed a meta-theoretical framework to summarize the prominent models of self-access in goal selection. According to the resulting dual-system communication model, self-access is based on a transfer of information from an implicit system, or System 1, to an explicit system, or System 2. Evaluative dispositions are stored as long-term memory contents in System 1. Such a disposition can be successfully retrieved and made available to conscious action control if a cognitive processing mode is available that fits the disposition's representation mode. The self-access models discussed are compatible with the dual-system communication framework, even though dual-system communication is specified more explicitly in some models than in others.

Models of self-access in goal selection may be classified according to two dimensions: level of analysis and consideration of interpersonal processes. Level of analysis concerns the question of how closely hypotheses and measurement methods correspond to the self-access concept, i.e. the question of whether merely self-report, or self-access outcome, or self-access process variables are considered. Consideration of interpersonal processes concerns the question of whether primarily intrapersonal processes—like self-perception—, or also interpersonal processes—like the internalization of externally originating goals—are thought to be relevant to self-access. Future research may profit from this synoptic review of self-access research in a number of ways, as becomes apparent from the following discussion.

A Need for Convergence

We have shown that the self-access models presented above share a number of characteristics, especially the idea of a transfer of information from an implicit to an explicit system, given that information is processed in a certain way. Nevertheless, the models differ with respect to the description of system characteristics, as well as processing prerequisites. The distinctive features of the two systems have been described as affective versus cognitive (Weinberger & McClelland, 1990), non-verbal versus verbal (Schultheiss & Strasser, 2012), or by a wide range of System 1 versus System 2 features (e.g. intuitive versus reflective; Kuhl, 2000). Moreover, in the different models, different processes underlying self-access have been

proposed: While, according to PSI theory, self-access rests on intuitive processing, the IPM proposes a translation process, which, presumably, encompasses encoding, translation, and decoding steps.

Duality models of self-access are diverse because the concept of duality is vague. Duality does not refer to a specific distinction between process or system characteristics, but to a class of models featuring two systems or types of processing, the exact nature of which is not precisely defined. In other words, even though the system characteristics mentioned above may be subsumed under System 1 versus System 2 processes, affective, symbolic, or intuitive processes, for example, need not be substantially intercorrelated. Because the duality distinction is realized in various distinct ways, there is diversity in the system and process descriptions of self-access models.

Given the similarity in the scope and general architecture of the models, is this diversity justified? If it were, it would need to be shown that the different models affect distinct self-access phenomena or distinct aspects of the self-access phenomenon. The diversity of models for a relatively universal subject constitutes a challenge for self-access research. Further studies should be undertaken to decide which of the assumptions—e.g. system and processing features—are most feasible from a theoretical and empirical point of view. In other words, researchers should strive for a convergence of the models, and—as far as possible—for a unifying model of self-access.

A Need to Discriminate

While the overall diversity of models is puzzling, there is nevertheless a need to distinguish between classes of self-access models. Notably, we have identified two different views of self-access that may require separate theoretical approaches: While some models assume that goals are internally generated, other models include some sort of conflict between internal and external sources of goals. These two classes of self-access models are fundamentally different: While the former primarily involve processes of self-perception, the latter involve—in addition to self-perception processes—processes of self-other distinction, internalization, and resistance to persuasion.

The question whether intrapersonal and interpersonal processes should be analysed within the same model or in separate models is a practical one. Can other-related processes be easily researched in paradigms used to tackle self-perception processes? Whatever the case may be, in future research, self-perception processes and outcomes should be clearly distinguished from other-related processes and outcomes, in theory as well as in methodology.

Measuring Self-Access: The Criterion Problem

Measuring self-access is difficult because it requires a quantification of how well an implicit system, or System 1, and an explicit system, or System 2, are aligned. The self-access criterion used in the different models corresponds to the level-of-analysis distinction introduced above, more precisely to its methodological aspect. The criterion may be (a) purely phenomenological, i.e. subjective, (low level of analysis), (b) based on a comparison between a subjective and an objective measure (medium level of analysis), or (c) include the measurement or manipulation of self-access processes (high level of analysis).

A well-established paradigm with a high level of analysis of type (c) is the induction of referential processing through affective imagination (see Schultheiss & Strasser, 2012). In this paradigm, processes are induced which are assumed to underlie self-access. Similarly, in preference consistency research (Lee et al., 2009; Nordgren & Dijksterhuis, 2009), process manipulations had an impact on measures related to self-access. Also research on the SMH (cf. Damasio et al., 1990) tested whether blocking the processes assumed to underlie self-access did indeed reduce self-access. However, the evidence generally speaks against self-access being mediated by peripheral, somatic processes (for a summary, see Dunn et al., 2006). The only known direct measure of self-access processes is the self-compatibility checking method (Kazén et al., 2003), which has not, however, been extensively tested. Thus, the manipulation of self-access processes is more common on this level of analysis than the measurement of such processes. Furthermore, process manipulation is used more extensively in the decision-making than in the goal-selection domain.

In many paradigms, self-access outcomes—which are situated on a medium level of analysis—rest on a comparison between a self-reported goal (or object) attribute and its

objective—i.e. non-self-report—counterpart. Typical exemplars of this category are motive-goal congruence (Brunstein, 2010) and self-infiltration (Kuhl & Kazén, 1994). Preference consistency measures are related to this kind of measures: They include a comparison of preference judgements with other preference judgements, in other words, a measurement of homogeneity of judgements on the same or similar objects. Thus, in the vast majority of models, self-access is thought to be related to the accuracy, or homogeneity, of conscious reports about goals or objects.

When the accuracy of people's reports is to be measured, pure self-reports of self-access (e.g. Sheldon, 2002) are of little use. However, it is probable that differences in self-access capabilities find expression in certain subjectively measurable states. For instance, two items from the Volitional Components Inventory (VCQ; Kuhl & Fuhrmann, 1998) aim to measure perceived self-congruence of actions. However, more comprehensive self-report instruments for the phenomenological concomitants of self-access—or lack thereof—are presently not available.

In sum, the three levels of analysis constitute a hierarchy of self-access criteria: purely subjective, comparison/outcome, and process criteria. Future research should attempt to encompass all three levels more fully. For instance, knowledge about the mechanisms underlying self-access may greatly profit from the inclusion of process manipulations or measurements. Subjective measures, on the other hand, might provide a convenient way of measuring self-access proxies.

Internalization and Self-Access: An Ambiguous Relationship

Situated on a medium level of analysis, the PLOC (SCM) and the self-infiltration (PSI theory) paradigm agree that self-access outcomes are related to a goal's state of internalization. Both approaches are based on the assumption that other-assigned goals may be gradually integrated into a person. Furthermore, they agree that the first step in the process of internalizing an externally originating goal is introjection of the goal. An introjected goal is considered a part of the self, even though it exerts its influence through a representation of some external object, e.g. an figure of authority or a social norm. According to the SCM, the

more internalized a goal is, the more intact self-access is thought to be. According to PSI theory, by contrast, lack of internalization is thought to indicate intact self-access. Put differently, the two models differ with respect to the question of whether internalization is functional or not.

A case can be made both for the functionality and the disfunctionality of internalization. For instance, an internalized regulation may use up less energy, or willpower, than an external regulation. Therefore, internalization may be regarded as an instance of efficient self-regulation. On the other hand, internalization may have detrimental consequences because of its disintegrative aspect. An internalized goal may exert an influence on a person, even though it is not in line with that person's needs or preferences. Thus, self-access affects internalization in different directions in PSI theory and the SCM, because they make different a priori assumptions about the goal's self-concordance and implement it differently in methodological terms. While the self-infiltration paradigm considers the internalization of unattractive items, the SCM's self-access measure features goals that are thought to be in line with the person's deeper needs. In sum, internalization of self-incongruent goals—as in PSI theory—is considered harmful, while internalization of self-congruent goals—as in SCM—is considered helpful.

The relationship between internalization and self-access is ambiguous, because different a priori assumptions are made about the self-congruence of goals. Do the SCM and PSI theory make such divergent assumptions because those assumptions are arbitrary? They are at least questionable. With respect to the self-infiltration paradigm, unattractive activities may serve higher-order values and goals and therefore be self-congruent. Consequently, it may be functional to internalize unattractive activities. With respect to the SCM—as discussed above—, the assumption that internally regulated goals must be self-congruent seems premature, because a person with deficient self-access might internalize even severely self-incongruent goals. In sum, the relationship between internalization and self-access is ambiguous because the underlying assumptions are not well-founded. Thus, the question of what goals may be considered self-congruent, emerges as a central theoretical question.

Paradigms in which an implicit and an explicit measure of the same constructs are

compared—like motive-goal congruence—are not based on a priori assumptions about certain goals being self-congruent. From this point-of-view, paradigms featuring implicit-explicit comparisons are to be preferred. However, one limitation of such comparison paradigms lies in their recourse to traits as the primary determinants of goal selection, and in the corresponding neglect of situational determinants.

Are Preferences Situationally Determined?

In most models of self-access in goal selection, self-access refers to the ability to retrieve evaluative dispositions, or stable preferences, from memory. In decision-making research, by contrast, the question of whether preferences for objects or actions may be dispositional is subject to debate. On the one hand, a large body of research shows that preferences are influenced by situational factors, e.g. available options, features of the task, or context (for a review, see Shafir & LeBoeuf, 2004), which suggests that constructive processes play a major role in preference judgements or decisions. On the other hand, it has been argued that contextual influences on preferences do not rule out inherent, i.e. dispositional preferences. Simonson (2008) holds that both inherent and constructed preferences play a role when decisions are made, and that inherent preferences are most influential when the object or action has been actually experienced.

This discussion is relevant for self-access research in two ways. Firstly, it is reminiscent of the notion of experiential versus verbal-symbolic processing that distinguishes the implicit and explicit motivational systems according to an early version of the IPM (Schultheiss, 2002). Imagery exercises, known to enhance self-access, may provide the subject with a simulation of actual experience, therefore making his or her inherent action preferences accessible. Thus, the view of Simonson (2008) converges with the IPM. Secondly, the question of whether dispositional or constructive processes prevail in a given situation, has largely been neglected by self-access research. This question is, however, of great importance, as the relative role of the two processes may moderate the influence of implicit motives, and other kinds of evaluative dispositions, on behaviour.

Summary and Conclusions

All models of self-access in goal selection and decision-making agree in assuming that some judgement- or decision-relevant memory contents may be retrieved more or less successfully, depending on situational and personality factors. The dual-system communication framework, which is based on the common features of self-access models, further specifies the mental systems and processes that are thought to underlie self-access processes. However, whether the dual-system communication framework is valid depends on the validity of the models it is based on.

Irrespective of its validity, the framework proves useful in several ways. Firstly, finding a common comparison of models allows knowledge to be applied across model boundaries. Secondly, identifying distinctive features of models helps to differentiate the self-access concept into several facets. Thirdly, the dual-system communication framework suggests that decisions between several possible explanations of the same phenomenon need to be attempted.

Self-access is researched in several subdisciplines of psychology and economics. Basic assumptions and methodological procedures vary. Therefore, self-access research appears fragmented with respect to theory and methodology. The dual-system communication framework may help to reduce fragmentation and turn diversity into unity.

Notes

[1]The term *goal-setting* is sometimes used to describe the goal-selection concept as defined here (e.g. Gollwitzer, 1990). However, goal-setting, as most prominently used, does not refer to the selection of goals from a large number of possible goals, but to the way in which a given goal is represented. In the theory of Latham and Locke (1991), for example, goal-setting refers to the level of specificity and difficulty of the intended action outcomes. Therefore, to avoid confusion, we use the—less common—term goal selection in the current paper.

[2]This model has been called an information processing account of implicit motive arousal (Schultheiss, 2002), or an information processing model of implicit and explicit motives (Schultheiss, 2008). For the sake of brevity, the model is referred to in the following as the information processing model of dual motivation (IPM).

[3]In more recent publications (e.g., McClelland et al., 1989), the TAT has been relabelled as the "picture story exercise" (PSE). However, as the measurement instrument has not significantly changed since it was first adapted to motive measurement (McClelland et al., 1953), the necessity for relabelling is not apparent.

[4]Hofer et al. (2010) attributed the divergent results for the power motive to cultural differences.

[5]In another study with content-matched instruments (Schultheiss, Yankova, Dirlikov, & Schad, 2009), significant implicit-explicit correlations were only found for the power motive but not for the achievement and affiliation motives.

[6]Note that, even though the IPM assumes the translation process to be bi-directional, it nevertheless serves the purpose of bringing the explicit motivational system—e.g. goals—into alignment with the implicit motivational system—e.g. implicit motives, and not vice versa. In short, bi-directional translation is a prerequisite for the uni-directional alignment of systems.

[7]The only exception was the significant effect of referential competence on congruence between achievement motives in Study 3.

[8]PLOC measures typically include questions about external, introjected, identified, and intrinsic—but not integrated—reasons for executing the behaviour (e.g., Sheldon & Elliot, 1999), the agreement to which the subject indicates on a Likert scale.

[9]But see Smith et al. (2007) for a contradictory result.

[10]For instance, Greguras and Diefendorff (2010) did not find an effect of self-concordance on goal-attainment. However, this finding appears to be a rare exception.

[11]It is doubtful, however, whether this fourth level fits McAdams's model. The three-level model is explicitly concerned with the description of individual differences on each of the levels. Thus, adding a level largely unrelated to individual differences makes little sense.

[12]Except in Study 1, where 24 items were used. Of these 8 were chosen and 8 suggested by the experimenter. In addition, Study 1 included activities related to the preparation of a birthday party, in addition to office activities.

[13]Note that, in Kazén et al. (2003, Study 2), affect was not directly manipulated but an induction of external pressure was used as a proxy variable of affect .

[14]Negative affect, which was not manipulated in this study, did not have an effect on false self-ascription.

[15] Sheldon (2004) has proposed the *organismic valuing process* (OVP; Rogers, 1961, as cited in Sheldon, 2004, p. 104), which allows people to revise their goal choices in a way that enhances their well-being and growth (Sheldon, 2004, p. 198). A small number of empirical studies have shown that subjects shift from extrinsic goals (e.g. material possessions) towards intrinsic goals (e.g. personal growth) over time (e.g., Sheldon, Arndt, & Houser-Marko, 2003; cf. Sheldon, Kasser, Smith, & Share, 2002). The organismic valuing process differs from the self-access processes discussed here in at least two respects. Firstly, research on the organismic valuing process has not been concerned with the concordance between people's goals and their individual, underlying dispositions. Instead it is based on an a priori evaluation of certain classes of goals, intrinsic versus extrinsic, as being desirable or undesirable, respectively. Secondly, individual differences in the organismic valuing process have not been taken into consideration by empirical research. For these reasons, the organismic valuing process does not concern self-access as defined in the current research and is therefore not discussed further.

[16] In epistemology, a correspondence between a fact and a belief—i.e. true belief—does not, in itself, constitute knowledge (for a summary, see Klein, 1998). For example, the true belief that the last name of the president of the United States of America in 1996 begins with a "C" is not knowledge if it is based on the false belief that the president was called Winston Churchill. Traditionally, it has been held that a false belief has to be based on sufficiently good reasons in order to be knowledge (Klein, 1998). Thus, strictly speaking, a correspondence between an implicit characteristic of a person and the conscious belief about that characteristic is only self-knowledge if the belief is held for sufficiently good reasons. It is difficult to ensure empirically that this condition is met. Therefore, concepts of fit should be preferred to concepts of self-knowledge wherever applicable.

[17]PSI theory and the SCM agree, however, in their assumption that an intermediate state of internalization, called introjection, signifies that a subject's goal does not entirely conform to his or her self.

[18]The conclusion that latent preferences are transitive does not rule out the possibility that preference consistency may constitute a valid measure of self-access, for two reasons. Firstly, researchers in economically oriented transitivity research did not consider individual differences in transitivity. It is possible that meaningful individual differences in consistency exist but have not been detected by previous research. Secondly, even though people—on average—are consistent in their latent preferences, individual differences in manifest preferences may, nevertheless, constitute a valid measure of self-access. For instance, the consistency of overt preferences may point to a subject's personality integration status. Therefore, it does not follow from the general consistency of latent preferences that consistency, taken as an individual difference variable, is unrelated to self-access.

[19]According to Bechara et al. (1996), the "term 'somatic' is used here in its broadest sense to include both musculoskeletal and visceral structures of the soma, as well as their neural representations in the central nervous system" (p. 215).

[20]Note that punishments are the salient incentives in the Iowa Gambling Task because they are relatively infrequent but high, whereas moderate rewards are given at each trial. Tomb, Hauser, Deldin, and Caramazza (2002) changed the reward and punishment schedule, so that the average magnitude of rewards and punishments was higher for good decks than for bad decks. Under these conditions, healthy subjects still preferred the good decks, but also developed SCRs for the good decks. Thus, SCRs do not seem to be related to high punishments but to the magnitude of the consequences of the decision, be they positive or negative.

[21]In social psychology, a large body of research addresses coping with attitudes and opinions held by others, namely in the field of persuasion (see Crano & Prislin, 2006, for a recent review). Interestingly, some influential persuasion models are duality models (e.g. the elaboration likelihood model; Petty & Wegener, 1999). Persuasion models, however, do not include self-access assumptions. They are concerned with external sources of attitude change, but not with internal or external sources of attitudes per se.

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Table 1

A 3 × 2 *Classification Scheme for Paradigms Describing Self-Access in Goal Selection*

	Consideration of Processes	
Level of Analysis	Intrapersonal	Intra- and Interpersonal
High	Referential processing (IPM)	Self-compatibility checking (PSI)
Medium	Motivational congruence (MDT)	Self-infiltration (PSI)
Low	–	PLOC (SCM)

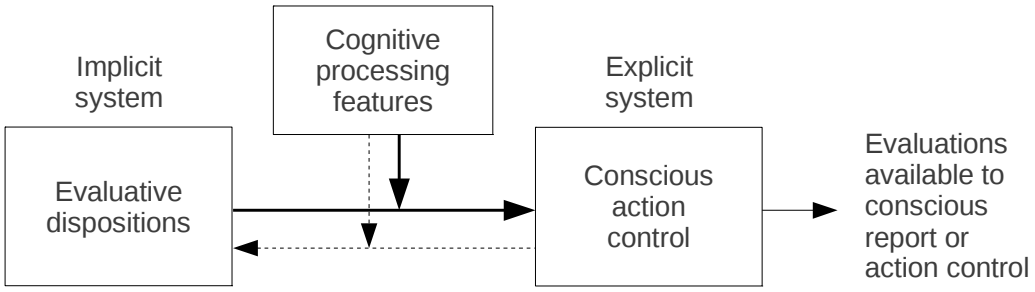
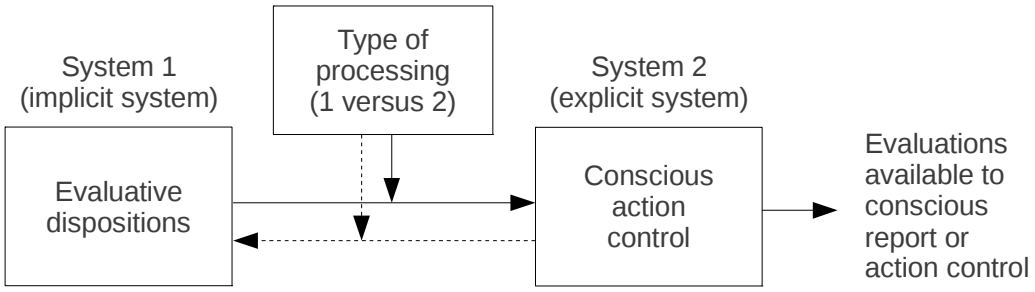
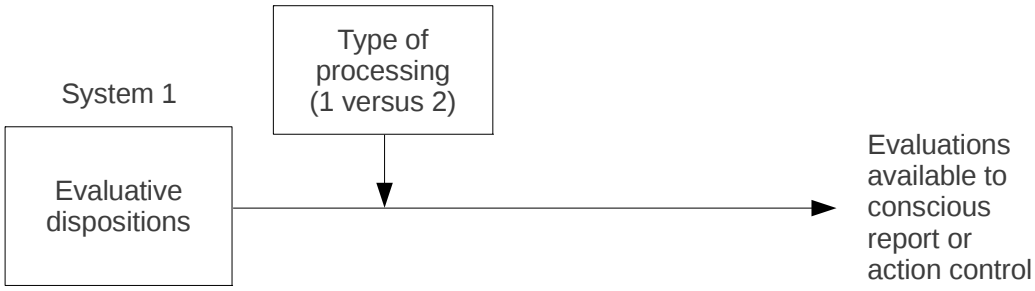


Figure 1. A dual-system communication framework: Whether evaluative dispositions towards certain future actions become available to conscious report or conscious action control depends on the transfer of information from an implicit system to an explicit system (bold arrows) and, according to Schultheiss and Strasser (2012), vice versa (dashed arrows). Such a transfer of information succeeds when the predominant processing mode corresponds to the way in which the information to be processed is represented.



(a) Theories of self-access in goal selection: Dual-system communication framework



(b) Theories of self-access in decision-making

Figure 2. Models of self-access in the goal-selection and decision-making domains are similar in that they assume that access to evaluative dispositions depends on which of two types of processing—System 1 versus System 2 processing—dominates in the mental system as a whole. They differ, however, in that models of self-access in decision-making—at least those included in the current paper—do not specify the system (of System 2 type) which mediates the self-access process, i.e. which makes evaluative dispositions available to conscious report or action control.

Self-Infiltration as a Measure of Self-Access: A Replication Study

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Data from the present study are also reported in Study 1 of the third paper of the present thesis, entitled “The consistency of preferences as a measure of self-access”. In the two studies, hypotheses regarding different outcome measures are tested. Because the data stem from the same data collection, the descriptions of some measurement instruments (ACS-90, PANAS), and the first three paragraphs of the procedure are identical in the two studies.

Abstract

False self-ascription of assigned activities, i.e. self-infiltration, has been proposed as a measure of access to one's own needs and preferences. The current research attempted to closely replicate research by Baumann and Kuhl (2003), who showed that subjects with a low action orientation who experience negative affect are particularly prone to self-infiltration. In an experimental setting, $N = 76$ subjects, mostly students, chose a number of office activities and were assigned additional activities. In a subsequent unexpected memory task, they had to indicate whether or not they had chosen the activities beforehand. Current affect, action orientation, and other personality variables were measured. Contrary to expectations, subjects with a high action orientation ($OR = 1.54$) were more prone to make self-infiltration errors than subjects with a low action orientation ($OR = 1.00$). Current affect did not predict self-infiltration. To explain the results, processes other than self-access processes need to be taken into account. It is argued that future self-infiltration research should consider general memory performance in more detail.

Keywords: self-infiltration, PANTER, PSI theory

Self-Infiltration as a Measure of Self-Access: A Replication Study

Learning has often been metaphorically referred to as the acquisition of something (Sfard, 1998). In Perls's (1969) view, for example, learning is like eating. Both activities involve the incorporation of new material into the organism. To be effective, both require material to be destroyed so as to be assimilated by the organism. An *introjection* is an instance of mental material that has not been successfully treated in this way. As Perls puts it, "introjection means preserving the structure of things taken in, whilst the organism requires their destruction" (p. 129; original in italics). According to Perls (1969), Gestalt therapy helps the patient to re-chew the introjected material in order to make assimilation possible.

Kuhl and Kazén (1994) developed an experimental method for measuring individual differences in the tendency towards introjection, the so-called *self-infiltration* measure. This measure was used to test hypotheses regarding situational and personality conditions that make introjection more probable. For a number of reasons, which are discussed below, a replication of the self-infiltration paradigm is necessary. Such a replication study is reported in the current paper, following a review of the existing self-infiltration literature.

Introjection as Internalization

The term introjection, originally coined by the psychoanalyst Ferenczi (1910), belongs to a broader class of *internalization* processes. After reviewing the psychoanalytical literature, Schafer (1968) defined internalization and its main types, introjection and identification. Internalization refers to processes by which external regulations are transformed into inner regulations (Schafer, 1968). As a result, the influence of an outside object (e.g., a person) on the subject continues when the object is absent. In the case of introjection, the representation of a person (or other person-like object) resides within the subject. This "inner person" may exert an influence on the subject and, in some cases, even be influenced by the subject (Schafer, 1968, p. 72). *Identification*, by contrast, refers to changes in "motives", behaviour patterns, and self-representations "in such a way as to experience being like, the same as, and merged" with an object (p. 140). So whereas, in the case of introjection, the object is displaced from the outer to the inner world relatively unchanged, identification changes the subject itself

(p. 153 f.).

In recent times, internalization processes have sparked interest in various fields of experimental psychology. In social psychology, Deci and Ryan (2000) have set out to empirically study internalization processes—especially with regard to the motivation for learning—, using vocabulary taken from the psychoanalytic and Gestalt therapy traditions. Their *organismic integration theory* (OIT; see Ryan & Deci, 2008)—a theory within self-determination theory (SDT)—postulates that externally regulated behaviour, i.e. behaviour motivated by external contingencies, such as reward or punishment, may be gradually internalized, resulting in a more self-determined regulation of behaviour. When regulation is internalized, it passes through the stages of introjection, identification, and integration. A behaviour's internalization status is measured using a self-report instrument, in which subjects indicate whether the perceived locus of causality (PLOC) is more internal or external. Empirical studies have shown that a more internal PLOC is beneficial to well-being (e.g. Black & Deci, 2000; Neyrinck, Vansteenkiste, Lens, Duriez, & Hutsebaut, 2006), performance (e.g. Turban, Tan, Brown, & Sheldon, 2007; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004), and persistence (e.g. Pelletier, Fortier, Vallerand, & Brière, 2001; Vallerand, Fortier, & Guay, 1997; for reviews, see Deci & Ryan, 2000; Ryan & Deci, 2008).

While SDT research has particularly considered the consequences of the internalization of goals that originate externally, *personality systems interaction theory* (PSI theory Kuhl, 2000, 2001) has focused on the situational and dispositional antecedents of internalization processes. According to PSI theory, the integrated self is modelled as an extended network of "implicit *self-representations*; that is, integrated representations of internal states such as needs, emotions, somatic feelings (e.g. muscle tensions), and values" (Kuhl, 2000, p. 130, emphasis in original). This network of self-representations is conceptualized as a memory system called *extension memory*. It is thought to process information in a parallel, holistic manner, thus taking a large number of self-aspects into account. In addition, the ability to integrate novel or painful experiences depends on the activity of extension memory. Introjection, in contrast, signifies that the integrative function of extension memory is deficient. According to this theory, introjection indicates that a person's *self-access*

capabilities, i.e. his or her ability to retrieve integrated self-representations, are impaired (Quirin & Kuhl, 2008).

Negative Affect and Action Orientation Predict Introjection

According to PSI theory, persistent negative affect reduces extension memory activity, which results in reduced access to integrated self-representations (Kuhl, 2001). To what extent negative affect has a detrimental impact on self-access depends on the personality disposition of *failure-related action orientation* (AOF; Kuhl, 1994). Subjects with a high AOF recover faster from failure or otherwise stressful experiences, than subjects with a low AOF, i.e. they are better at overcoming ruminative thoughts and negative affect (Jostmann, Koole, Van Der Wulp, & Fockenberg, 2005; Koole & Jostmann, 2004). Thus, while negative affect reduces self-access, AOF buffers this reduction and helps the subject recover from stressful experiences and thus regain self-access capabilities sooner.

Empirical testing of the hypothesized antecedents of self-access was made possible by Kuhl and Kazén (1994), who developed a paradigm to measure impaired self-access in terms of a tendency towards introjection. In contrast to the self-report measure used in SDT research, this paradigm features an objective—i.e. not self-reported—measure of self-access. In the paradigm, subjects are asked to simulate a working day in an office, in the course of which they are asked to choose a number of activities (e.g. “sort the post”, “sharpen the pencils”) for later execution. Likewise, they are assigned a number of activities by the “boss” (or the experimenter). In a subsequent, unexpected memory task, subjects must decide for each activity whether it originated with the subject him- or herself, or with the boss. Activities assigned by the boss and—erroneously—classified as self-selected by the subject indicate impaired self-access. Because subjects who score high on this measure allow—metaphorically speaking—an alien force (i.e., the boss) to secretly populate their “self”, this measure is also called *self-infiltration*. In a number of studies, self-infiltration has been shown to depend on AOF in association with state variables, notably negative affect (Baumann & Kuhl, 2003; Kazén, Baumann, & Kuhl, 2003; Kuhl & Kazén, 1994).

Thus, the self-infiltration paradigm has been successfully used to explore antecedents of

self-access. Nevertheless, we argue that a close replication of the paradigm is necessary, particularly to test its robustness with respect to small variations in procedure. The current research attempted to replicate the self-infiltration paradigm by means of an independent, but largely equivalent implementation. Self-infiltration was expected to depend on the combined influence of negative affect and AOF. This hypothesis is prominent in self-infiltration research, as can be seen from the following review of the literature.

Reviewing the Self-Infiltration Literature

To date, 13 studies using self-infiltration as a dependent variable have been published in five journal articles (Baumann & Kuhl, 2003; Baumann, Kuhl, & Kazén, 2005; Baumann & Scheffer, 2011; Fuhrmann & Kuhl, 1998; Kazén et al., 2003; Kuhl & Kazén, 1994; Quirin, Koole, Baumann, Kazén, & Kuhl, 2009, see Table 1). Early studies included AOF as the focal predictor, but did not consider negative affect as a potential predictor of self-access. Kuhl and Kazén (1994) developed a paper-and-pencil procedure for measuring self-infiltration. In these studies, between 24 and 27, mostly office-related, activities were shown to subjects. Subjects chose one third of items and were then assigned another third of the items they had not previously chosen. In a subsequent, unexpected memory task, subjects had to decide for each activity whether it had been *chosen*, *assigned*, or neither chosen nor assigned (i.e. a *remaining* activity). Activities not previously chosen but classified by the subject as having been chosen were counted as *false self-ascriptions* (FSA). The extent to which the number of false self-ascriptions (FSA) of assigned activities exceeded the number of FSAs of remaining activities served as a measure of self-infiltration. The results of two experiments showed that subjects low in AOF made more FSA errors with assigned, compared with remaining items, $OR = odds(assigned)/odds(remaining) = 3.96$, while no such difference emerged in subjects with a high AOF, $OR = 1.02$. In Experiment 2, AOF predicted self-infiltration ($OR_{high\ AOF} = 0.75$; $OR_{low\ AOF} = 2.88$) only if an uncompleted intention had been induced. This moderating effect of an uncompleted intention was explained by excessive working memory load due to intention maintenance in low-AOF subjects (cf. Goschke & Kuhl, 1993).

The paper-and-pencil procedure suffers from one major shortcoming: Its memory

measurement does not reflect a pure distinction between self and other, but is confounded by the subject's liking of activities. When subjects decide whether they chose an activity themselves, the decision may rely on at least two different cues (cf. Johnson, Hashtroudi, & Lindsay, 1993): firstly, the episodic memory of the choice situation and, secondly, the subject's liking of the activity. The activities chosen by the subject are the activities that the subject likes best. Thus, liking is a good cue for deciding whether or not the activity was chosen, irrespective of any memory effect.

The computer-based version of the self-infiltration procedure, which is implemented in a software package by the name of PANTER[1] (Baumann & Kuhl, 2003), allows liking effects to be separated from memory effects by varying item attractiveness independently of memory-relevant manipulations. In this procedure, subjects first rate the attractiveness of all the activities. In the subsequent choice task, subjects are presented lists of six activities and required to choose half of the activities from each list. In order to control for item attractiveness, items from the same attractiveness quartile are presented in each list of six. Thus, subjects are forced to choose attractive and unattractive items in equal proportions. This procedure ensures that liking is no longer a valid cue for deciding whether or not an activity was actually chosen. Thus, the self-infiltration measure reveals self-other confusion independently of memory for attractiveness.

Kazén et al. (2003) conceptually replicated Study 1 by Kuhl and Kazén (1994) using the computer-based PANTER procedure. Office activities were replaced by mini-actions ("clap your hands", "touch your left elbow"). Subjects were told that the attractiveness of a number of mini-actions needed to be known so as to develop a program for emotion perception in preschool children. As in Kuhl and Kazén (1994), AOF affected self-infiltration. However, this was only true for unattractive[2] mini-actions. When mini-actions had a low level of attractiveness, the number of FSAs for assigned mini-actions exceeded the number of FSAs for remaining mini-actions in low-AOF subjects ($OR = 2.61$) but not in high-AOF subjects ($OR = 0.92$). No such interaction resulted for attractive items ($OR_{low\ AOF} = 1.18$; $OR_{high\ AOF} = 1.04$). The authors explained that the moderating effect of attractiveness was due to different internalization processes for pleasant versus unpleasant ideas, norms, or goals

(Kazén et al., 2003). While pleasant ideas etc. are internalized through identification, unpleasant ideas are introjected (definitions: see above). PSI theory makes predictions for introjection but not for identification, which is why predictions are only made for unattractive items (Baumann & Kuhl, 2003). This limiting condition has been taken into account in most published PANTER studies.

While the studies discussed so far did not include a measure or manipulation of current affect, three published studies have tested whether self-infiltration can be predicted by current negative affect interacting with AOF (Kazén et al., 2003, Experiment 3; Baumann & Kuhl, 2003, Experiments 1 and 2; see also Baumann & Scheffer, 2011). This test is crucial, because a central claim of PSI theory is that negative affect leads to impaired self-access and therefore to increased self-infiltration, while AOF buffers the detrimental effects of negative affect (Kuhl, 2000, 2001). In two studies (Kazén et al., 2003, Experiment 3; Baumann & Kuhl, 2003, Experiment 1), AOF and current affect were measured. In both cases, low-AOF subjects experiencing high negative affect displayed higher FSA rates for assigned as opposed to remaining unattractive items (see Table 1 for details).

Quirin et al. (2009) contributed the only replication study using the classic paper-and-pencil self-infiltration procedure (Kuhl & Kazén, 1994). They induced moderate stress in all subjects using unpredictable auditory startles and measured the biological stress response using saliva cortisol levels. In this study, contrary to expectations, neither negative affect nor AOF predicted self-infiltration. However, self-infiltration was related to cortisol levels as measured both at Time 1 (baseline) and Time 2 (25 minutes after the stress task).[3]

In one study (Baumann & Kuhl, 2003, Experiment 2), affect was manipulated to corroborate a causal influence of negative affect or stress on self-infiltration. The PANTER software was used. Affect was manipulated between subjects using a funny versus a sad film. Low-AOF subjects in a sad—but not in a happy—mood displayed a self-infiltration effect for unattractive items ($OR = 2.29$). High-AOF subjects did not show a self-infiltration effect under the same conditions ($OR = 0.67$) or under any other conditions.

In sum, while early studies found an effect of AOF alone, or in combination with the induction of an uncompleted intention, later research focused on the prediction of

self-infiltration through the AOF × Negative Affect interaction. The latter hypothesis is supported by three PANTER studies, but not supported by one paper-and-pencil study. Thus, successful replications exist for the PANTER method but not for the paper-and-pencil method (see Table 1).

The self-infiltration effect is not due to a general memory effect but to the specific error of classifying assigned activities as having been chosen. In the PANTER studies, several measures were taken to exclude the alternative explanation of a general memory effect. Firstly, they controlled for the FSA of items that were neither chosen nor assigned. Secondly, in some studies (Baumann & Kuhl, 2003; Baumann et al., 2005), false other-ascription (FOA)—the error of classifying chosen activities as assigned—was analyzed in addition to FSA. In most cases, FOA was not predicted by the variables predicting FSA (for an exception, see Baumann et al., 2005, Study 2). Thirdly, in some studies (Baumann et al., 2005), it was shown that, from a signal detection perspective, performance in the choice memory task—i.e. discrimination between items that were chosen or not chosen—did not depend on predictors of self-infiltration. In sum, it can be concluded from the literature that the self-infiltration effect cannot be attributed to general memory deficits.

Insert Table 1 about here

The Current Research

Self-infiltration. In science, any new effect must be replicated by independent studies (Popper, 1959/2002). However, according to van Ijzendoorn (1994), *exact replication* is only one of a number of possible replication strategies. *Varied replications*, van Ijzendoorn argues, allow knowledge about an effect's boundary conditions to be accumulated (but see Pashler & Harris, 2012, for an opposite opinion). The current study aimed to perform a close—but not exact—replication of the self-infiltration effect found in Baumann and Kuhl (2003, Experiment 1). Even though the influence of affect and AOF on self-infiltration has been demonstrated in three studies (Baumann & Kuhl, 2003; Kazén et al., 2003, Study 3), a replication is nevertheless necessary, for two reasons.

Firstly, all recent self-infiltration studies—with one exception—have been conducted using the same PANTER software. There is therefore little variation in the procedure used in these studies. Although the instructions and items differ between them, the general design, the response options and the general procedure remain the same. It cannot therefore be shown, using the original PANTER, that self-infiltration effects are invariant to small changes in procedure.

Secondly, as the PANTER dates back to an earlier period of personal computing, i.e. the early nineties, and runs in an MS-DOS window, the usability of the software is severely limited from today's point of view. Choices are made in a two-colour console window using arrow, space, and other keys. A mouse is not supported. These limitations may have an impact on self-infiltration effects. Working on arduous tasks may lead to a general increase in negative affect and therefore heighten the general tendency towards self-infiltration. Moreover, the complexity of the original PANTER implementation necessitates frequent interventions by the experimenter, which may make the experimenter's presence more salient to the subject. As the experimenter represents authority—and is sometimes explicitly named as the source of activity assignments—a highly salient experimenter may increase or decrease self-infiltration tendencies, depending on whether reactance processes (Miron & Brehm, 2006) take place.

For these reasons, it is necessary to replicate self-infiltration effects. In the current study, the effect of naturally occurring affect and AOF on self-infiltration was tested using an independent implementation of the PANTER procedure. Low-AOF subjects high in negative affect were expected to display self-infiltration for unattractive items, while high-AOF subjects and subjects low in negative affect were expected not to display self-infiltration. In addition, the prediction of a self-other distinction was tested from a signal detection perspective, to check whether self-infiltration effects were due to a general memory deficit.

Self-compatibility checking. Kazén et al. (2003) reported a second measure of self-access, known as *self-compatibility checking*. When the subject decides whether an activity was self-chosen, two features of the activity may be cognitively activated. On the one hand, the subject may judge the attractiveness of the activity; on the other hand, the subject may remember whether he or she chose the activity earlier in the study. A conflict between

these two features should result in prolonged reaction times in the choice memory task. More specifically, in the case of incongruence between attractiveness and choice, i.e. if the subject classifies an unattractive activity as having been chosen or an attractive activity as not having been chosen, reaction times should be longer than in the case of congruency between attractiveness and choice.

Subjects with intact self-access—having a clear, stable representation of both the attractiveness and the choice feature—should experience more conflict and therefore show a larger increase in reaction times than subjects with impaired self-access. Kazén et al. (2003) found longer reaction times for conflicting trials in high-AOF but not in low-AOF subjects. In accordance with these results, we expected longer reaction times for conflicting trials and, more importantly, a more pronounced increase in reaction times in high-AOF as compared with low-AOF subjects.

Additional trait predictors of self-infiltration. In the existing literature, AOF has predominantly been considered as a trait predictor of self-infiltration (e.g., Kazén et al., 2003; Kuhl & Kazén, 1994). However, if self-infiltration does indeed indicate self-access, it should be related to other trait variables that, theoretically, predict self-access or self-knowledge. Therefore, additional trait variables were included in the current study.

Neuroticism. According to PSI theory, persistent negative affect hinders self-access (Kuhl, 2001). As subjects with a high level of neuroticism experience negative affect more frequently and for longer periods of time (Verduyn & Brans, 2012), they should be more likely to be in a state of reduced self-access than low-neuroticism subjects. We therefore expected subjects with a high level of neuroticism to be more prone to self-infiltration than subjects with a low level of neuroticism.

Faith in intuition and need for cognition. Cognitive-experiential self-theory (CEST; Epstein, 1994) distinguishes a rational from an experiential mental system. While the rational system processes information in a controlled, analytic fashion, the experiential system processes information automatically and holistically. The two types of processing are conceptualized as being independent of one another, i.e., both types of processing may be active in a given task, and each independently to a small or large extent.

When developing hypotheses about cognitive characteristics of memory systems in PSI theory, Kuhl (2001) relied on the experiential-rational distinction. The proposed information processing characteristics of extension memory are very similar to the processing characteristics of the experiential system in CEST.

Epstein, Pacini, Denes-Raj, and Heier (1996) proposed two personality traits, faith in intuition (FI) and need for cognition (NFC; Cacioppo & Petty, 1982), to measure the activity of the experiential and rational system, respectively. As, according to PSI theory, experiential processing should foster self-access, we expected subjects with a high FI to display reduced levels of self-infiltration. Given that highly intuitive processing was present, rational processing was not expected to hamper self-infiltration. Therefore, we expected only FI but not NFC to be related to self-infiltration.

Attention to and clarity of feelings. In recent years, a large number of theories have stressed the functional role of affect in decision-making (for a review, see Loewenstein & Lerner, 2003). Affective processes have been proposed to mediate consumer decision-making (affect heuristic; Slovic, Finucane, Peters, & MacGregor, 2007), risky decision-making (Damasio, Tranel, & Damasio, 1990), behaviour selection ("feeling is for doing"; Zeelenberg, Nelissen, Breugelmans, & Pieters, 2008), and social communication (affective orientation; Booth-Butterfield & Booth-Butterfield, 1994). These theories share the assumption that affective processing helps to make decisions that provide an optimal fit between incentives and one's own preferences. Thus affective processing should facilitate self-access in terms of perceiving one's own needs, wishes, or values.

Emotional intelligence is defined as a class of emotion-related abilities, including accurate perception of emotions, accessing one's emotions to assist thought, understanding, and regulating emotions (Mayer, Salovey, & Caruso, 2004). Such abilities may help one to use affective processes that facilitate self-access. In the current study, attention to feelings, clarity of feelings, and mood repair were measured using a self-report instrument (Trait Meta-Mood Scale; Salovey, Mayer, Lee Goldman, Turvey, & Palfai, 1995). Subjects with high levels of attention to and clarity of feelings were expected to display less pronounced levels of self-infiltration than subjects scoring low on these variables.

Method

Participants

Data were collected from $N = 76$ subjects (61 women, 15 men) recruited at the University of Zurich through an internet-based participant recruitment system. Subjects were $M = 23.5$ ($SD = 6.8$) years of age. Seventy subjects (92%) were students. Subjects could choose between monetary (CHF 15.–, approximately € 12.50; 24 subjects) and course credit compensation (52 subjects).

Materials[4]

Instructions and office activities. The wording of the instructions was based on instructions used in Baumann and Kuhl (2003) and modified where necessary, e.g. to match the mouse-based method of input. Forty-eight office activities were taken from a recent item set used in PANTER research (C. Lüdecke, personal communication, June 28, 2010) and adapted slightly to Swiss language usage. Sample items are "stamping a letter", "hanging up a calendar" (all two-word expressions in German).

Action orientation. A 24-item Action Control Scale (ACS-90; Kuhl, 1994) was used to measure demand-related (AOD) and failure-related (AOF) action orientation. For each item, subjects are required to choose either alternative A or alternative B. An example of an item for AOD is "When I know I must finish something soon: A. I have to push myself to get started. B. I find it easy to get it done and over [sic; authors' note] with." An example of an item for AOF is "When I have lost something that is very valuable to me and I can't find it anywhere: A. I have a hard time concentrating on something else. B. I put it out of my mind after a little while." (translations from Kuhl, 1994). In both examples, alternative B indicates action orientation. Internal consistency was adequate for both AOD (Cronbach's $\alpha = .73$) and AOF (Cronbach's $\alpha = .72$).

Affective state. Affect was measured using the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988; German translation by Krohne, Egloff, Kohlmann, & Tausch, 1996). Subjects are shown 10 negatively and 10 positively valenced adjectives (e.g. "interested", "distressed", "excited") and are asked to choose one of the five verbal anchors

for each item, ranging from *very slightly or not at all* to *extremely*. In the present study, subjects were asked to indicate how they "feel right now". Internal consistency for positive affect (Cronbach's $\alpha = .87$) and negative affect (Cronbach's $\alpha = .86$) was good.

Big Five personality factors. Big Five personality factors were measured using the Personality Adjective Scales (PASK5; Brandstätter, 2010). This questionnaire consists of 32 pairs of short self-descriptions, e.g. "careless" versus "conscientious", "assertive" versus "shy". Subjects indicate whether and to what extent the left-hand or the right-hand expression describes them better on a scale ranging from 1 to 9. Each of the five personality factors is computed using weighted sums of all items (Brandstätter, 2010). The factors estimated are self-control, anxiety, independence, intransigence, and extraversion.

Faith in intuition and need for cognition. Experiential versus rational thinking styles were measured using the Rational-Experiental Inventory (Epstein et al., 1996; German translation by Keller, Bohner, & Erb, 2000). Two subscales, faith in intuition and need for cognition, are included in the questionnaire. All answers are given on 7-point Likert scales ranging from 1 ("does not apply at all") to 7 ("fully applies"). Faith in intuition is measured using 15 items, e.g. "I am a very intuitive person", or "I believe in trusting my hunches". Need for cognition is measured using 14 items based on the scale of the same name by Cacioppo and Petty (1982), e.g. "I would prefer complex to simple problems", "Thinking is not my idea of fun". Reliability was good for both faith in intuition (Cronbach's $\alpha = .83$) and need for cognition (Cronbach's $\alpha = .85$).

Attention to and clarity of feelings. Attention to and clarity of feelings were measured using the Trait Meta-Mood Scale (TMMS; Salovey et al., 1995; German translation by Otto, Döring-Seipel, Grebe, & Landermann, 2001). This instrument consists of 30 statements about the person. Answers are given on 5-point Likert scales ranging from 1 (*strong contradiction*) to 5 (*strong agreement*). The attention to feelings subscale consists of 13 items, e.g. "It is usually a waste of time to think about your emotions". The clarity of feelings subscale consists of 11 items, e.g. "I am rarely confused about how I feel" (wording from Salovey et al., 1995). Reliability was acceptable for attention (Cronbach's $\alpha = .77$) and good for clarity of feelings (Cronbach's $\alpha = .87$).

Procedure

Subjects were tested individually in a room without daylight. The experimenter was present throughout data collection, separated from the subject by a divider. Data were collected using an IBM-compatible personal computer running a Psychtoolbox (Version 3; Brainard, 1997) script. All instructions were presented on the computer screen. Subjects responded using the computer mouse.

The purpose of the study—as presented to subjects—was "to find out how office clerks organize their work, plan actions and how they feel while doing so". Subjects were told to imagine they were an office clerk about to perform a variety of activities. Their affective state was measured using the PANAS. Next, the 48 office activities were presented sequentially in a predefined random order. Subjects indicated how attractive they judged each activity to be on a 19-point scale ranging from -9 (*extremely unattractive*) to $+9$ (*extremely attractive*).

In the two following tasks, subjects were assigned half of the activities and, in addition, chose half of the activities. The order of assignment and choice tasks was balanced between participants. In the choice task, subjects were presented with lists of six activities of which they had to choose three. In each trial, subjects could select and deselect each activity presented ad libitum, and then confirm their choice, given that exactly three activities were selected.

In the assignment task, half of the items were assigned to the participant for later execution. Items were presented successively on screen. Two rectangles were presented, in the bottom left- and right-hand corners of the screen, labelled "assigned" and "not assigned". For half of the subjects, the "assigned" label was on the left-hand side, for the other half, it was on the right-hand side. Activities that had been assigned were prefixed by an asterisk (*). Each activity appeared in a top centre position. Subjects were required to drag the activity into the respective rectangle, depending on whether it was assigned or not. In addition, subjects were told to read every activity aloud. The assignment task was preceded by two ascending and followed by two descending beep tones. Subjects who failed to read the activities aloud were reminded to do so by the experimenter.

Following the choice and assignment tasks, subjects answered the ACS-90 and the

PASK5 and rated their current affect again using the PANAS. After that, source memory for choice and assignment was measured in two unexpected recognition memory tasks. In each memory task, all the items were shown, one by one, in a random order. Subjects were told to indicate whether they had chosen (choice memory task) or been assigned (assignment memory task) each of the items presented. The order of the choice and assignment memory tasks was the same as the order of choice and assignment earlier in the procedure (which had been varied between participants).

Subjects were told to place their index and middle fingers on the two mouse buttons. One mouse button indicated a positive (*yes*) answer, the other button a negative (*no*) answer. The assignment of the mouse buttons was balanced between participants and constant across the two memory tasks. The first of the two memory tasks was preceded by a training task consisting of 6 items. In the training task, sample items were presented together with the required response (e.g. “yes, chosen” or “no, not chosen”). Subjects were told to give the respective response using the mouse buttons. They were instructed to react “spontaneously”. Before the start of each actual memory task, subjects were reminded once again of the button assignment.

Following the second memory task, subjects filled out the TMMS and the REI and provided demographic data. When subjects had completed these questionnaires, they were probed for suspicion, debriefed, thanked and received their compensation. None of the subjects correctly guessed the research question.

Within and between subjects balancing. The attractiveness (1–4) of the items, assignment, and choice were completely balanced for individual participants, resulting in four categories of items: *chosen* (and not assigned), *assigned* (and not chosen), *both* (i.e., chosen and assigned), and *remaining* (i.e. neither chosen nor assigned). In each of these categories of size 12, three items corresponded to each of the four levels of attractiveness. The order of assignment and choice (choice first, assignment first), order of “assigned” versus “not assigned” rectangles (assign left, assign right), and assignment of the yes button (yes left, yes right) were completely balanced between participants.

Results

Preliminary Analyses

Negative affect ranged from 10 to 29 ($M = 13.3$, $SD = 4.5$) and was considerably skewed ($g_1 = 2.1$). For the subsequent analyses, the variable was split at the median. Thirty-nine subjects were classified as having a high negative affect ($M = 16.1$, $SD = 4.9$), and 37 subjects were classified as having a low negative affect ($M = 10.5$, $SD = 0.5$). For the following analyses, AOF was centred on its mean. Item attractiveness, source and affect were coded as $-1, 1$, with the positive value indicating high attractiveness, low negative affect and an *assigned* source. Descriptives and zero-order correlations of the hypothesised self-access predictors are shown in Table 2.

As is customary in self-infiltration research, item attractiveness was recoded from a four-level into a dichotomous variable (high, low). Items classified as unattractive ($M = 6.9$, $SD = 3.9$) had been rated as being significantly less attractive than items classified as attractive ($M = 13.5$, $SD = 3.1$), $b = 3.30$, $SE = 0.068$, $t(1747) = 48.6$, $p < .001$ (mixed linear model). Thus, the PANTER script successfully classified the activities according to each subject's attractiveness ratings.

An alpha level of $p < .05$ was chosen for all tests. Hypotheses were tested using mixed logit regressions with a penalized quasi-likelihood estimator (Venables & Ripley, 2002), unless otherwise specified.

Insert Table 2 about here

Predicting Self-Access from Affect and Action Orientation

False self-ascription. In the following analyses, the terms false self-ascription (FSA) and self-infiltration is used with slightly different denotations. While false self-ascription denotes the erroneous classification of a non-chosen item as having been chosen, self-infiltration denotes a higher self-ascription rate for assigned items, compared with items that were neither assigned nor chosen (cf. Baumann & Kuhl, 2003).

The hypotheses derived from theoretical considerations concerned self-infiltration, but not false self-ascription as such. In line with Baumann and Kuhl (2003), self-infiltration was predicted to be higher in low-AOF subjects reporting high negative affect than in high-AOF subjects or subjects reporting low negative affect. This effect was only expected for unattractive items. As self-infiltration is indicated by an interaction between a predictor and item source, a significant Source $\times$ Attractiveness $\times$ Affect $\times$ AOF interaction was expected.

Only assigned and remaining items were included in the following analysis, which corresponds to 1824 data points (24 per subject). Items that had not been chosen in the choice task but were classified as chosen in the memory task were identified as false self-ascriptions. Across all subjects, 631 false self-ascriptions were made (8.3 per subject; 35% of data points).

The effect of control variables on false self-ascription and self-infiltration was tested using a mixed logit model. False self-ascription was regressed on attractiveness rating item number, choice memory task item number, order of assignment and choice (choice first, assignment first), order of "assigned" versus "not assigned" rectangles (assign left, assign right), and assignment of yes button (left, right). The odds of making a false self-ascription were higher for items that were rated later, $b = 0.007$, $SE = 0.0037$, $t(1746) = 2.02$, $p = .043$. No other significant effects were seen ($p > .45$). Rating item number was included in the following analysis.

The main hypothesis was tested using a second mixed logit model. False self-ascription was regressed on rating item number, item attractiveness (low, high), source (assigned, remaining), affect (low, high) and AOF. Moreover, all interactions were included up to the fourth order for attractiveness, source, affect, and AOF. The effect of rating item number was no longer significant, $b = 0.00008$, $SE = 0.0039$, $t(1735) = 0.02$, $p = .984$. Significant main effects of item attractiveness, $b = 0.57$, $SE = 0.055$, $t(1735) = 10.47$, $p < .001$ and source, $b = 0.11$, $SE = 0.053$, $t(1735) = 2.02$, $p = .044$, emerged. The odds of false self-ascription were higher for attractive, compared with unattractive items ($OR = 1.77$) and higher for assigned, compared with remaining items ($OR = 1.11$). AOF interacted with item attractiveness, $b = -.04$, $SE = 0.019$, $t(1735) = -2.01$, $p = .045$, and with source, $b = 0.04$, $SE = 0.019$, $t(1735) = 2.04$, $p = .041$, in the prediction of false self-ascription. In addition,

the Attractiveness × Affect × AOF interaction was significant, $b = -0.05$, $SE = 0.019$, $t(1735) = 2.84$, $p = .005$. No other main effects or interactions approached significance, including the expected Source × Attractiveness × Affect × AOF interaction, $b = 0.02$, $SE = 0.019$, $t(1735) = 1.26$, $p = .209$.

To further describe the interactions, the log(odds) of false self-ascription for the different predictor levels were predicted from the model and transformed into odds. For AOF, values for 1 *SD* below and above the mean were predicted. From the odds, the odds ratios signifying self-infiltration—i.e. $OR = odds(FSA_{assigned})/odds(FSA_{remaining})$—were computed. Accordingly, the AOF × Source interaction signifies more self-infiltration in high-AOF ($OR = 1.54$), than in low-AOF subjects ($OR = 1.00$; Figure 1).

Insert Figure 1 about here

The AOF × Attractiveness and the Attractiveness × Affect × AOF interactions do not include the source and therefore do not concern self-infiltration but only false self-ascription. The following result is described in terms of odds ratios signifying higher odds of FSA in high-AOF compared with low-AOF subjects, i.e. $OR = odds(FSA_{high\ AOF})/odds(FSA_{low\ AOF})$. The AOF × Attractiveness interaction signifies that, for unattractive items, the odds of making a false self-ascription were higher for high-AOF than for low-AOF subjects ($OR = 1.42$), while the opposite was the case for attractive items ($OR = 0.91$).

This interaction was further qualified by the Attractiveness × Affect × AOF interaction. For unattractive items, the higher odds of false self-ascription of high-AOF compared with low-AOF subjects were more pronounced in cases of low negative affect ($OR = 1.57$) than in cases of high negative affect ($OR = 1.29$). For attractive items, in contrast, high-AOF subjects were more likely than low-AOF subjects to make a false self-ascription when displaying high negative affect ($OR = 1.47$), but less likely to do so when displaying low negative affect ($OR = 0.56$).

According to PSI theory, self-infiltration is expected to depend on the AOF × Affect but not on the AOD × Affect interaction. Therefore, the effect of AOD on self-infiltration was

tested using a mixed logit model. In line with the predictions of PSI theory, AOD was expected to interact—if at all—with positive affect (Kuhl, 2001). False self-ascription was regressed on age, rating item number, item attractiveness, source, positive affect, AOD, and the second, third, and fourth-order interactions between attractiveness, source, positive affect, and AOD. False self-ascriptions were more likely in older subjects, $b = 0.035$, $SE = 0.015$, $t(70) = 2.29$, $p = .025$, and for attractive items, $b = 0.58$, $SE = 0.056$, $t(1712) = 10.42$, $p < .001$. No other main effects or interactions were significant, $p > .05$.

Exploring the specificity of self-infiltration effects. The self-infiltration measure reported above represents a specific memory measure, since a difference between two item categories, $FSA_{assigned}$ and $FSA_{remaining}$, is used as the self-infiltration indicator. In the literature, the specificity of self-infiltration effects has been demonstrated in two additional ways: Firstly, it has been shown that only false self-ascription depends on the predictors—in our case, affect and AOF—but not *false other-ascription* (FOA). Secondly, it has been shown that memory performance, i.e. self-other distinction in signal detection terms, is not affected by the same predictors. These two tests of effect specificity are conducted in the following.

False other-ascription. Mixed logit models equivalent to the self-infiltration models above were calculated, using false other-ascription of self-chosen activities as the outcome variable. Activities that were not assigned but were classified by the subject as having been assigned were identified as false other-ascriptions. To determine the effect of control variables, false other-ascription was first regressed on attractiveness rating item number, choice memory task item number, order of assignment and choice (choice first, assignment first), order of "assigned" versus "not assigned" rectangles (assign left, assign right), and assignment of *yes* button (yes left, yes right). If the choice task preceded the assignment task, more false other-ascriptions were made, compared with the opposite order, $b = 0.043$, $SE = 0.14$, $t(72) = 3.15$, $p = .002$. No other effects were significant. The order of tasks was included in the following analysis.

In the main hypothesis test, false other-ascription was regressed on order of choice and assignment tasks, attractiveness (low, high), source (chosen, remaining), negative affect (low, high), and AOF. The odds of false other-ascription were higher when the choice task preceded

the assignment task, $b = 0.56$, $SE = 0.17$, $t(71) = 3.23$, $p = .002$, for attractive items, $b = 0.47$, $SE = 0.05$, $t(1736) = 8.78$, $p < .001$, and for *chosen* source, $b = 0.90$, $SE = 0.054$, $t(1736) = 16.62$, $p < .001$. Subjects displaying higher negative affect tended to make more false other-ascriptions, $b = -0.16$, $SE = 0.084$, $t(71) = -1.88$, $p = .065$.

Furthermore, the Source $\times$ Affect interaction was significant, $b = 0.15$, $SE = 0.054$, $t(1736) = 2.70$, $p = .007$. Subjects with a high negative affect made more false other-ascriptions for chosen, compared with remaining items, $OR = odds(FOA_{chosen})/odds(FOA_{remaining}) = 8.12$. The same was true for subjects with low negative affect, though to a smaller extent, $OR = 4.53$.

Finally, the significant Attractiveness $\times$ Negative Affect $\times$ AOF interaction, $b = -0.05$, $SE = 0.195$, $t(1736) = -2.41$, $p = .016$, concerns the prediction of FOA, irrespective of source. For unattractive items, the odds of FOA under conditions of high negative affect were higher than the odds of FOA under conditions of low negative affect, both for high-AOF, $OR = odds(FOA_{high\ negative})/odds(FOA_{low\ negative}) = 1.24$, and low-AOF, $OR = 1.23$, subjects. For attractive items, in contrast, the odds of FOA were higher under conditions of low negative affect, compared with high negative affect in low-AOF subjects, $OR = 0.90$, while in high-AOF subjects FOAs were more probable for high as opposed to low negative affect, $OR = 2.58$.

Self-other distinction in memory. In a second attempt to corroborate the specificity of the self-infiltration effects, memory performance was tested in terms of signal detection. Signal detection theory is the method of choice for analysing recognition data (Tanner & Swets, 1954). From a signal detection perspective, the self-infiltration measure reported above exclusively takes false alarms (i.e. activities falsely classified as chosen) into account and ignores information about hits (i.e. activities correctly classified as chosen). Thus, the analysis does not control for response tendencies. For example, subjects with a tendency to answer yes in the choice recognition task have higher FSA rates even though they may not be worse at distinguishing chosen from non-chosen items. The data were therefore analysed using signal detection methods. The following analysis does not correspond closely to the self-infiltration analysis reported above, as all items are included—not only the items that were not

chosen—and correct self-ascriptions are taken into account in addition to false self-ascriptions.

DeCarlo (1998) recommends the analysis of recognition data using probit or logit models, in which the subject's response to the item (here: yes, no) is predicted by the actual choice status (here: chosen, not chosen). Self-other distinction is present if an item's choice status has a significant effect on the subject's response. The distance measure commonly known as d' corresponds to the model coefficient b of the main effect of item status.

We assume that reduced self-access is indicated by reduced self-other distinction, i.e. it does not only result in higher odds of a false self-ascription but also in lower odds of a correct self-ascription. If low-AOF subjects with a high negative affect tend to confuse assignment status with choice status, then their choice recognition classifications should either depend on the assignment status or the Assignment $\times$ Choice interaction. This should not be the case in high-AOF subjects or in subjects with low negative affect.

In a mixed logit model, the subject's response (yes, no) was regressed on choice (chosen, not chosen), assignment (assigned, not assigned), item attractiveness, negative affect, mean-centred AOF, and all interactions up to the fifth order.

Overall, items that had been chosen were more likely to be classified as chosen than non-chosen items, $b = d' = 1.74$, $SE = 0.107$, $t(3544) = 16.28$, $p < .001$. Also, items that had been previously assigned tended to be classified as chosen more often than unassigned items, $b = 0.20$, $SE = 0.104$, $t(3544) = 1.89$, $p = .059$. Furthermore, attractive items were more often classified as having been chosen than unattractive items, $b = 0.52$, $SE = 0.075$, $t(3544) = 6.93$, $p < .001$. No other main effects approached significance ($p > .4$).

The Choice $\times$ Assignment interaction was not significant, $b = -.24$, $SE = 0.150$, $t(3544) = -1.62$, $p = .106$, indicating that the discrimination of chosen versus not chosen activities did not reliably depend on prior assignment.[5] Thus, self-other distinction was not generally affected by assignment. Furthermore, no higher-order interaction involving both choice and assignment was significant, indicating that an interference of assignment status with memory performance did not depend on any of the variables included.

The significant interaction between choice and negative affect, $b = 0.29$, $SE = 0.107$, $t(3544) = 2.73$, $p = .006$, reveals better choice recognition under conditions of high,

$OR = odds(hit)/odds(false\ alarm) = 6.77$, as opposed to low, $OR = 3.79$, negative affect.

The following two interactions do not concern an influence on memory performance, as they do not include choice item status as a predictor. The AOF × Assignment interaction, $b = 0.07$, $SE = 0.037$, $t(3544) = 1.98$, $p = .048$, signifies that high-AOF subjects, $OR = odds(chosen_{assigned})/odds(chosen_{not\ assigned}) = 1.38$, were more likely to classify assigned, rather than unassigned, items as having been chosen, while the opposite was the case for low-AOF subjects, $OR = 0.84$.

Finally, classifying an activity as having been chosen was predicted by an Attractiveness × Negative Affect × AOF interaction, $b = 0.07$, $SE = 0.027$, $t(3544) = 2.74$, $p = .006$. For attractive items, high-AOF subjects displaying low negative affect made fewer *self* classifications than low-AOF subjects, $OR = odds(chosen_{high\ AOF})/odds(chosen_{low\ AOF}), = 0.71$, while for unattractive items or subjects with a high negative affect this difference disappeared or was reversed, $1.02 < OR < 1.15$.

Self-compatibility checking. The effect of item attractiveness and AOF on reaction time was analysed as a process measure of self-access. High-AOF subjects were expected to show prolonged reaction times when classifying attractive, rather than unattractive, items as not having been chosen and also when classifying unattractive, rather than attractive, items as having been chosen. Low-AOF subjects, by contrast, were not expected to show these effects.

The choice memory task reaction time, the criterion variable, included 3648 data points, 48 per subject. Incorrect responses were excluded from the analyses (1177 data points; 32 %). In addition, reaction times below 250 ms (1 data point) and above 10 s (4 data points) were excluded from the analyses. In sum, 2466 data points (68 %) from all 76 subjects were included in the analyses. The reaction times used ranged from 266 to 9494 ms ($M = 1565$, $SD = 959$) and were strongly skewed ($g_1 = 3.05$). Thus they were log-transformed, which resulted in a more moderate skew ($g_1 = 0.77$). Item attractiveness was treated as a continuous variable. It ranged from 1 to 19 ($M = 10.5$, $SD = 4.8$) and was only slightly skewed ($g_1 = -0.35$). Rating and AOF were centred on their mean for all analyses. The data included similar numbers of yes (1274) and no (1192) responses. The response type variable (yes, no)

was coded as $-1, 1$, with the positive value indicating the *yes* response.

To test the effect of control variables on reaction time, a first mixed linear model was computed. The reaction time was regressed on choice item set number (1–8), item position in the choice task (1–6), choice recognition task item number (1–48), assignment of buttons in the choice recognition task (yes left, yes right), and order of assignment and choice tasks (assignment first, choice first). The reaction times for items appearing earlier in the lists of 6 items of the choice task were shorter, compared with the times for items appearing further down the lists, $b = 0.0095$, $SE = 0.0048$, $t(2387) = 1.98$, $p = .048$. The reaction times were longer for items appearing earlier in the memory task, i.e. with lower choice recognition task item numbers, $b = -0.0022$, $SE = 0.0006$, $t(2387) = -3.60$, $p < .001$. No other effects were significant, $p > .17$. The two significant item position variables were included in the main analysis.

The main hypothesis was tested using a second mixed linear model. Log-transformed reaction times were regressed on response type (yes, no), AOF, rating, and all interactions. The reaction times for *no* responses were longer than the reaction times for *yes* responses, $b = -0.03$, $SE = 0.0093$, $t(2389) = -3.60$, $p < .001$. Responses to attractive items took longer than to unattractive items, $b = 0.006$, $SE = 0.0021$, $t(2389) = 2.68$, $p = .007$. Response type interacted with AOF, $b = -0.008$, $SE = 0.0034$, $t(2389) = -2.40$, $p = .016$. The Response Type $\times$ AOF interaction signifies that action-oriented subjects took longer to give *no* answers compared with *yes* answers, while the opposite was true for state-oriented subjects. Response type also interacted with rating, $b = -0.01$, $SE = 0.0019$, $t(2389) = -6.78$, $p < .001$, in the prediction of the reaction time. Subjects took longer to identify unattractive (predicted logarithmic reaction time $log[RT] = 7.30$), as opposed to attractive ($log[RT] = 7.17$), activities as having been chosen; on the other hand they took longer to identify attractive ($log[RT] = 7.39$), as opposed to unattractive ($log[RT] = 7.20$), activities as not having been chosen. No other main effects or interactions were significant ($p > .19$).

Predicting Self-Access from Additional Trait Variables

The effect of variables from the PASK5, the REI and the TMMS on self-access was tested using mixed logit models with a penalized quasi likelihood estimator. Rating item number—the variable that has been shown to predict self-infiltration in the above analyses—was included in the following analyses as a control variable. Moreover, item attractiveness was included as a potential moderator, since self-infiltration is hypothesised to be restricted to unattractive items.

Big Five personality factors. Self-infiltration was expected to depend on neuroticism but not on other personality factors. The PASK5 anxiety dimension was used as a measure of neuroticism. Neuroticism ranged from 25.6 to 78.9 ($M = 50.6$, $SD = 14.4$) and was centred on its mean for the following analysis. In a mixed logit model, false self-ascription was regressed on rating item number, item attractiveness, source, mean-centred neuroticism, and all second- and third-order interactions involving attractiveness, item type, and neuroticism. Attractive items, $b = 0.57$, $SE = 0.054$, $t(1741) = 10.57$, $p < .001$, and assigned items, $b = 0.10$, $SE = 0.053$, $t(1741) = 1.98$, $p = .048$, were more likely to be falsely self-ascribed than unattractive and remaining items, respectively. The effect of source was qualified by a significant Source $\times$ Neuroticism interaction, $b = -0.01$, $SE = 0.004$, $t(1741) = -2.00$, $p = .046$, indicating that low-neuroticism subjects, $OR = odds(FSA_{assigned})/odds(FSA_{remaining}) = 1.52$, showed higher levels of self-infiltration than high-neuroticism subjects, whose self-infiltration was close to zero, $OR = 0.998$. Furthermore, the Source $\times$ Neuroticism $\times$ Item Attractiveness interaction was marginally significant, $b = 0.01$, $SE = 0.004$, $t(1741) = 1.74$, $p = .081$. For attractive items, moderate self-infiltration was equally present for low-neuroticism ($OR = 1.30$) and high-neuroticism ($OR = 1.23$) subjects. For unattractive items, however, low-neuroticism subjects ($OR = 1.78$) tended to make more self-infiltration errors than high-neuroticism subjects ($OR = 0.81$; Figure 2). No other main effects or interactions approached significance ($p > .29$).

Insert Figure 2 about here

Parallel analyses were conducted including the remaining personality factors as predictors. No main effects or interactions resulted that included one of the PASK5 dimensions self-control, independence, or intransigence. Extraversion, however, interacted with attractiveness in the prediction of false self-ascription, $b = 0.01$, $SE = 0.004$, $t(1741) = 2.38$, $p = .017$. While for attractive items, extraverted subjects made more false self-ascription errors than introverted subjects, $OR = odds(FSA_{extraverted})/odds(FSA_{introverted}) = 1.24$, the opposite was the case for unattractive items, $OR = 0.75$.

Faith in intuition and need for cognition. Faith in intuition (FI) ranged from 20 to 99 ($M = 68.3$, $SD = 12.4$). A mixed logit analysis was conducted to test the effect of FI on self-infiltration. False self-ascription (FSA) was regressed on rating item number, item attractiveness, source, FI, and all second- and third-order interactions involving attractiveness, source, and FI. As above, the odds of FSA were higher for attractive compared with unattractive items, $b = 0.57$, $SE = 0.054$, $t(1741) = 10.54$, $p < .001$, and for assigned compared with non-assigned items, $b = 0.11$, $SE = 0.053$, $t(1741) = 2.14$, $p = .033$. Moreover, high-FI subjects were less prone to FSA than low-FI subjects, $b = -0.02$, $SE = 0.008$, $t(74) = -2.34$, $p = .022$. Furthermore, the Attractiveness $\times$ FI interaction was marginally significant, $b = 0.007$, $SE = 0.004$, $t(1741) = 1.79$, $p = .073$. For attractive items, high-FI subjects made fewer FSA errors than low-FSA subjects, $OR = odds(high\ FI)/odds(low\ FI) = 0.75$. This effect tended to be more pronounced for unattractive items, $OR = 0.52$. The FI $\times$ Source interaction did not reach significance, $b = 0.002$, $SE = 0.004$, $t(1741) = 0.67$, $p = .502$. Thus the lower FSA rate of high-FI subjects was independent of the source. In other words, FI did not affect self-infiltration defined as $odds(FSA_{assigned})/odds(FSA_{remaining})$.

In an equivalent analysis, need for cognition (NFC), as measured using the REI scale by the same name, was predicted. NFC ranged from 43 to 97 ($M = 73.1, SD = 12.2$). In a mixed logit model, FSA was regressed on rating item number, item attractiveness, source, NFC, and all second- and third-order interactions involving attractiveness, source, and NFC. As above, significant main effects of attractiveness, $b = 0.56$, $p < .001$, and source, $b = 0.11$, $p = .035$,

emerged. However, neither the main effect of NFC, $b = -.004$, $SE = 0.009$, $t(74) = -0.49$, $p = .625$, nor the Source $\times$ NFC interaction, $b = -0.001$, $SE = 0.004$, $t(1741) = -0.19$, $p = .846$, reached significance. Thus NFC predicted neither FSA nor self-infiltration (modelled in terms of the Source $\times$ NFC interaction). No other main effects or interactions approached significance ($p > .27$).

Attention to and clarity of feelings. Attention to feelings ranged from 32 to 63 ($M = 52.2$, $SD = 6.2$). In a mixed logit model, FSA was regressed on rating item number, item attractiveness, source, attention to feelings and all second- and third-order interactions involving attractiveness, source, and attention to feelings. No main effects or interactions involving attention to feelings resulted, $p > .18$.

Clarity of feelings ranged from 16 to 30 ($M = 40.2$, $SD = 7.4$). An equivalent analysis to that described above was conducted, with clarity instead of attention to feelings. The only effect including clarity of feelings that approached significance was the Attractiveness $\times$ Source $\times$ Clarity interaction, $b = -.01$, $SE = 0.007$, $t(1741) = -1.80$, $p = .073$. This interaction signifies that, for unattractive items, low-clarity subjects, $OR = odds(FSA_{assigned})/odds(FSA_{remaining}) = 1.17$, were marginally less prone to self-infiltration than high-clarity subjects, $OR = 1.30$. For attractive items, by contrast, high-clarity subjects, $OR = 0.91$, did not display self-infiltration, whereas low-clarity subjects, $OR = 1.74$, displayed large amounts of self-infiltration (Figure 3).

Insert Figure 3 about here

Discussion

Previous research has shown that self-access, as measured by self-infiltration, is reduced in state-oriented (i.e. low-AOF) subjects with negative affect (Baumann & Kuhl, 2003; Kazén et al., 2003). The current study aimed to closely replicate this effect using an independent implementation of the self-infiltration paradigm. Furthermore, it was hypothesized that high-AOF, as opposed to low-AOF, subjects take longer to make self-/non-self decisions that conflict with attractiveness, because of better self-compatibility checking. Finally, the

construct validity of the self-infiltration measure was tested by examining its correlations with trait variables assumed to be related to self-access abilities.

A number of office activities were presented to the subjects, of which they chose some and were, in addition, assigned others by the boss. In an unexpected memory task, subjects were required to indicate which activities they had previously chosen. Each activity erroneously classified as having been chosen even though it had been assigned indicated an instance of false self-ascription (FSA). Self-infiltration was taken to occur if FSA for assigned activities was higher than FSA for neutral activities (i.e. activities that had neither been assigned nor chosen). The combined effect of AOF and negative affect on self-infiltration was expected only for unattractive activities, as the theory does not apply to the identification processes that take place when attractive activities are assigned.

The results indicate that self-infiltration for unattractive activities was not higher for low-AOF subjects with negative affect. On the contrary, high-AOF subjects had a higher probability of self-infiltration, irrespective of attractiveness. Thus, the classical self-infiltration effect was not replicated and in fact significantly reversed. This result directly contradicts the results of Baumann and Kuhl (2003, Study 1) and Kazén et al. (2003, Study 3). It may be concluded that the combined effect of negative affect and AOF is reversed under certain, as yet unspecified, conditions.

The unexpected result may be explained in two ways: either using PSI-theoretical reasoning, or by taking memory processes into account. According to PSI theory (Kuhl, 2001), self-access should be reduced under conditions of high negative affect. The naturally occurring negative affect in the current study was, however, conspicuously low. The mean negative affect score was 12.8, on a scale ranging from 10 to 50. Consequently,—although in contrast to Baumann and Kuhl (2003, Study 1) and Kazén et al. (2003, Study 3)—no main effect of negative affect on self-infiltration was observed.

Studies from PSI theory research have shown self-regulation deficits in action-oriented, as opposed to state-oriented, subjects under relaxed conditions e.g., Jostmann and Koole (2006, 2007). Jostmann and Koole (2006, Study 1), for instance, report a lower operation span in action- as opposed to state-oriented subjects in an *accepting* state, while the opposite was

true when they were in a *demanding* state. In addition, in self-infiltration research, self-access deficits have been reported in action-oriented subjects under relaxed conditions. Baumann and Kuhl (2003, Study 1), for example, report self-infiltration for unattractive items in the low-sadness group for action-oriented, but not for state-oriented subjects. As the subjects in the current study were generally relaxed, the result of higher self-infiltration in action-oriented (i.e. high-AOF) subjects is in line with action-orientation research. To explain such results, Jostmann and Koole (2006) argued that the self-regulatory functioning of action-oriented subjects is optimal under demanding conditions, while state-oriented subjects function better under accepting or relaxing conditions.

As the PANTER paradigm makes use of a memory measure to measure self-infiltration, cognitive processes need to be taken into account in addition to explanations from PSI theory. The memory task included in PANTER features two incidental learning tasks—i.e. learning tasks without explicit learning instructions: choice and assignment—and a subsequent (unexpected) memory task concerning the prior choices. Performance in this memory task may depend on the cognitive effort spent in encoding the items in connection with their context (i.e. their source), and therefore, more generally speaking, on the depth of processing during the learning tasks. Depth of processing has been shown to depend on current mood, in that a negative mood supports analytic, bottom-up processing, whereas depth of processing is likely to be less effortful and more top-down when the subject is in a positive mood (Schwarz, 1990). This may explain why subjects with a low AOF and a high level of neuroticism—i.e. subjects who are more prone to a negative mood—outperformed high-AOF and low-neuroticism subjects, respectively, in the self-infiltration memory task.

One might argue that self-infiltration does not reflect general memory performance, since it is defined as a specific difference between two types of false alarm, $FSA_{assigned}$ and $FSA_{remaining}$. However, negative affectivity was found to have effects on other memory measures. Subjects with a high negative affect tended to make more false other-ascriptions (FOA) and made significantly more FOA of chosen compared with remaining items. Furthermore, memory performance—analysed using signal detection methodology—was better under conditions of high, compared with low, negative affect. These results show that

not only self-infiltration but memory performance in general depended on variables indicating negative affectivity. Like self-infiltration, general memory performance in the choice memory task may serve as a measure of self-access, as it indicates the ability to report whether or not a goal originated within the person.

Another possible self-access measure, which more closely corresponds to the classic self-infiltration measure, is the confusion of an activity's assignment status with its choice status. Evidence for such a confusion has been found in that high-AOF subjects relied on an activity's assignment status when deciding whether they had previously chosen it, while low-AOF subjects did not. This unidirectional crosstalk phenomenon is a sign of a specific type of self-other confusion in high-AOF subjects, which may account for the effect of AOF in the classic self-infiltration measure.

From a methodological point of view, a mixed logit model with item status as a predictor is to be preferred for the analysis of self-infiltration data, as it takes overall memory performance into account, includes all data points, and enhances control of response tendencies. The current study features—for the first time in self-infiltration research—such an analysis, which is fully compliant with signal detection theory.

In addition to self-infiltration and memory measures, reaction times of the choice memory task were analysed as a measure of self-access processing (see Kazén et al., 2003). Results showed that item attractiveness influenced processing in self/not-self decisions. Subjects took longer to classify unattractive, as opposed to attractive, items as having been chosen, or to classify attractive, as opposed to unattractive, items as not having been chosen. However, contrary to expectations, this effect was no stronger in high-AOF subjects than in low-AOF subjects. Thus, no evidence was found for more pronounced self-compatibility checking in high-AOF subjects. In other words, results from the analysis of reaction times are neither compatible with previous research (Kazén et al., 2003), nor with better self-access in low-AOF subjects, as suggested by the self-infiltration data of the current study.

While the hypothesis that high-AOF subjects experience more conflict between choice and attractiveness, and therefore display longer decision times, is plausible, other hypotheses are possible regarding the influence of AOF on decision times. For instance, the conflict

experienced may have a smaller impact on high-AOF subjects, because—by definition—they are better able to regulate unpleasant states (Koole & Kuhl, 2008). This may result in an opposite effect to the hypothesized self-access effect superimposing the latter.

Before we discuss the relationships between traits and self-infiltration in more detail, some intercorrelations between traits are worth noting. In theory, neuroticism and AOF are related but functionally different variables. While neuroticism indicates high sensitivity to punishment cues, AOF indicates the ability to cope with negative affect once it is aroused (see Baumann & Kuhl, 2002). In the current study, neuroticism and AOF were moderately and significantly negatively correlated, as expected. More importantly, they were significant predictors of faith in intuition and clarity of feelings. Low-AOF, as well as highly neurotic, subjects reported lower faith in intuition and clarity of feelings. If the latter two variables are indeed proxies of self-access, then these relationships may hint at the hypothesized relationship between negative affect and self-access.

However, the relationships between other assumed trait proxies of self-access only partially corroborated this hypothesis. Self-infiltration was not related to faith in intuition or attention to feelings. It was, however, related to clarity of feelings, interacting with item attractiveness. For attractive items, high-clarity subjects did not display any self-infiltration, whereas low-clarity subjects showed large amounts of self-infiltration. For unattractive items, a much smaller difference emerged in the opposite direction.

Two conclusions can be drawn from this result. Firstly, with respect to *remaining* items, low-clarity subjects were affected less by item attractiveness than high-clarity subjects, indicating that being unclear about one's feelings may be associated with a lower sensitivity to attractiveness information. Secondly, in line with predictions, low-clarity subjects displayed more self-infiltration, although—contrary to predictions—only for attractive items. This result shows that self-infiltration may not only be present for unattractive, but also for attractive activities. It must be noted that the stability and reliability of self-infiltration as a trait measure has so far not been established. Thus, a low correlation between self-infiltration and traits may be due to fluctuations in self-infiltration over time.

In sum, the effect of AOF on self-infiltration in the unexpected direction, as found in the

current data, can be explained either as a self-regulation deficit or as a general memory deficit in AOF subjects. The current results do not allow a decision as to which of the two theoretical approaches is to be preferred. Assumed trait proxies of self-access were, again contrary to expectations, mostly uncorrelated with self-infiltration, or else correlated in an unexpected direction, as in the case of neuroticism. Thus neither a replication of the classic self-infiltration effect, nor a validation of the self-infiltration measure using trait measures was successful.

Outlook and Conclusions

In the current study, self-infiltration and self-other distinction in memory could be predicted using several different variables, though the processes that mediate these effects remain unclear. More research is therefore needed into the antecedents of and processes involved in self-infiltration. Firstly, memory processes need to be scrutinized. The current research has shown that the dissociation of general memory effects from specific self-infiltration effects is by no means trivial. To facilitate the analysis of memory processes, simplifications of the paradigm—which currently includes two, possibly interacting, encoding phases (i.e. choice and assignment)—should be considered. Moreover, analyses should be conducted from a strict signal detection perspective, as this ensures that all available information is taken into account and general memory effects are controlled for. Accordingly, the self-infiltration construct may have to be redefined as crosstalk from the assignment to the choice-encoding task. Secondly, the influence of affect and AOF on self-infiltration has not been replicated using experimental methods, Baumann and Kuhl (2003, Study 2) being the only such study. A replication of this effect is a crucial test of the PSI-theoretical hypothesis of reduced self-access under persisting negative affect. Thirdly, as the relationship between emotional clarity and self-infiltration has shown, self-infiltration should be considered not only for unattractive but also for attractive tasks. Research on identification processes, which are supposed to be the result of the assignment of attractive items, could be conducted within the self-infiltration paradigm with only minor modifications.

The results of the current study imply that the combined effect of negative affect and AOF on self-infiltration is not as robust as previously thought. Although it remains unclear

which theories best explain individual differences in self-infiltration, the construct as such is not called into question by the current findings. However, the current research shows that analysing self-infiltration data from a memory-psychological perspective may lead to deeper insights into the processes that constitute self-infiltration effects.

Notes

[1] The acronym "PANTER" stands for "Process Analytic Neuroticism Test for Adults" (in German: Prozess-Analytischer Neurotizismus-Test für Erwachsene).

[2] In the following, the terms *unattractive* and *attractive* refer to the items whose attractiveness is below and above the median attractiveness, respectively.

[3] None of the predictors in this study was experimentally manipulated.

[4] All materials and instructions used were in the German language. Instructions in this report are our literal translations, unless otherwise specified.

[5] The slight tendency towards an interaction is due to a marginally better memory performance for assigned, $OR = odds(hit)/odds(false\ alarm) = 5.72$, compared with unassigned, $OR = 4.49$, items.

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Table 1

Published Self-Infiltration Studies

	Paper	Study	*N*	State Boundary Condition	Method	$OR_{low\ AOF}$	$OR_{high\ AOF}$
1.	Kuhl & Kazén, 1994	1	72	–	paper-and-pencil	3.96	1.02
2.		2	48	uncompleted intention	paper-and-pencil	2.88	0.75
3.	Fuhrmann & Kuhl, 1998	1	45	low-difficulty focus	paper-and-pencil	–	–
4.		2	48	self-punishment instruction	paper-and-pencil	–	–
5.	Baumann & Kuhl, 2003	1	63	high negative affect	PANTER	2.40	0.63
6.		2	32	high negative affect	PANTER	2.29	0.67
7.	Kazén et al., 2003	1	60	–	PANTER	2.61	0.92
8.		2	46	high external pressure	PANTER	5.47	0.85
9.		3	48	high negative affect	PANTER	2.29	0.45
10.	Baumann et al., 2005	1	32	left-hemispheric activation	PANTER	–	–
11.		2	28	left-hemispheric activation	PANTER	–	–
12.	Quirin et al., 2009		48	acute stress	paper-and-pencil	–	–
13.	Baumann & Scheffer, 2011	2	111	high achievement flow motive	PANTER	1.74	0.80

Note: In most studies, the effect of AOF on self-infiltration is further qualified by a boundary condition in terms of subject state (state boundary condition). In PANTER studies, odds ratios (OR) for low-AOF and high-AOF subjects represent the self-infiltration effect size for unattractive items (Kuhl & Kazén, 1994, for all items), within state boundary conditions. In paper-and-pencil studies, ORs represent the self-infiltration effect size across all items, within the state boundary conditions. The studies by Fuhrmann and Kuhl (1998) do not contain a self-infiltration measure in terms of FSA differences by source. The studies by Baumann et al. (2005) do not contain descriptive data regarding the low- versus high-AOF comparison. The study by Quirin et al. (2009) does not contain descriptive data. Hence no ORs could be computed for these studies.

Table 2

Means, Standard Deviations, and Zero-Order Correlations of Variables Expected to Predict Self-Access

Variable	*M*	*SD*	1	2	3	4	5	6
1. AOF	5.1	2.8						
2. Negative Affect	12.8	3.4	−.25*					
3. Neuroticism	50.6	14.4	−.45***	.36**				
4. Faith in Intuition	68.3	12.5	.30**	−.29*	−.28*			
5. Need for Cognition	73.1	12.3	.15	−.04	−.07	.11		
6. Attention to Feelings	52.2	6.2	−.07	−.02	−.02	.18	−.03	
7. Clarity of Feelings	40.2	7.4	.32**	−.43***	−.47***	.32**	.25*	.16

Note: $N = 76$.

*$p < .05$, **$p < .01$, ***$p < .001$.

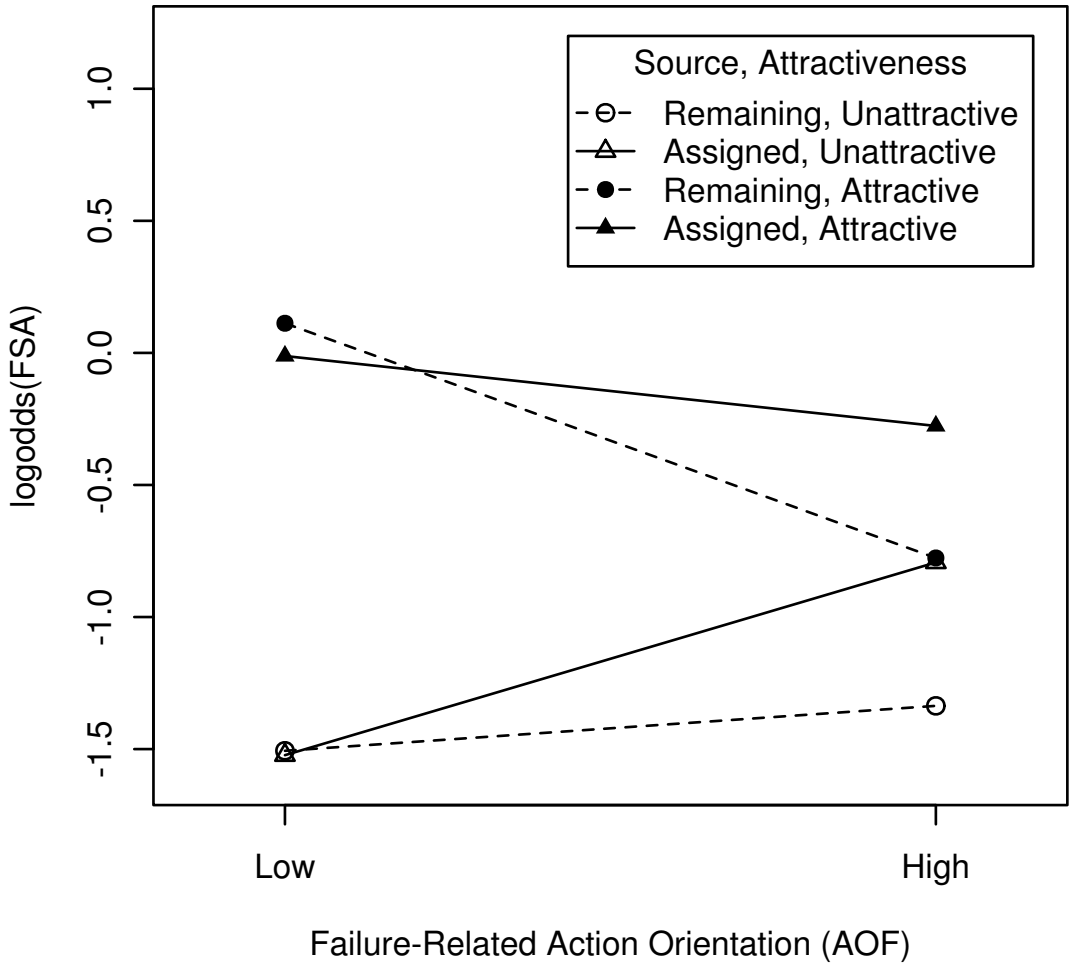

Figure 1. Prediction of false self-ascription from item source, item attractiveness, and AOF. Higher logodds(FSA) of assigned, compared with remaining items signify self-infiltration. High-AOF subjects showed higher degrees of self-infiltration than low-AOF subjects for both unattractive and attractive items.

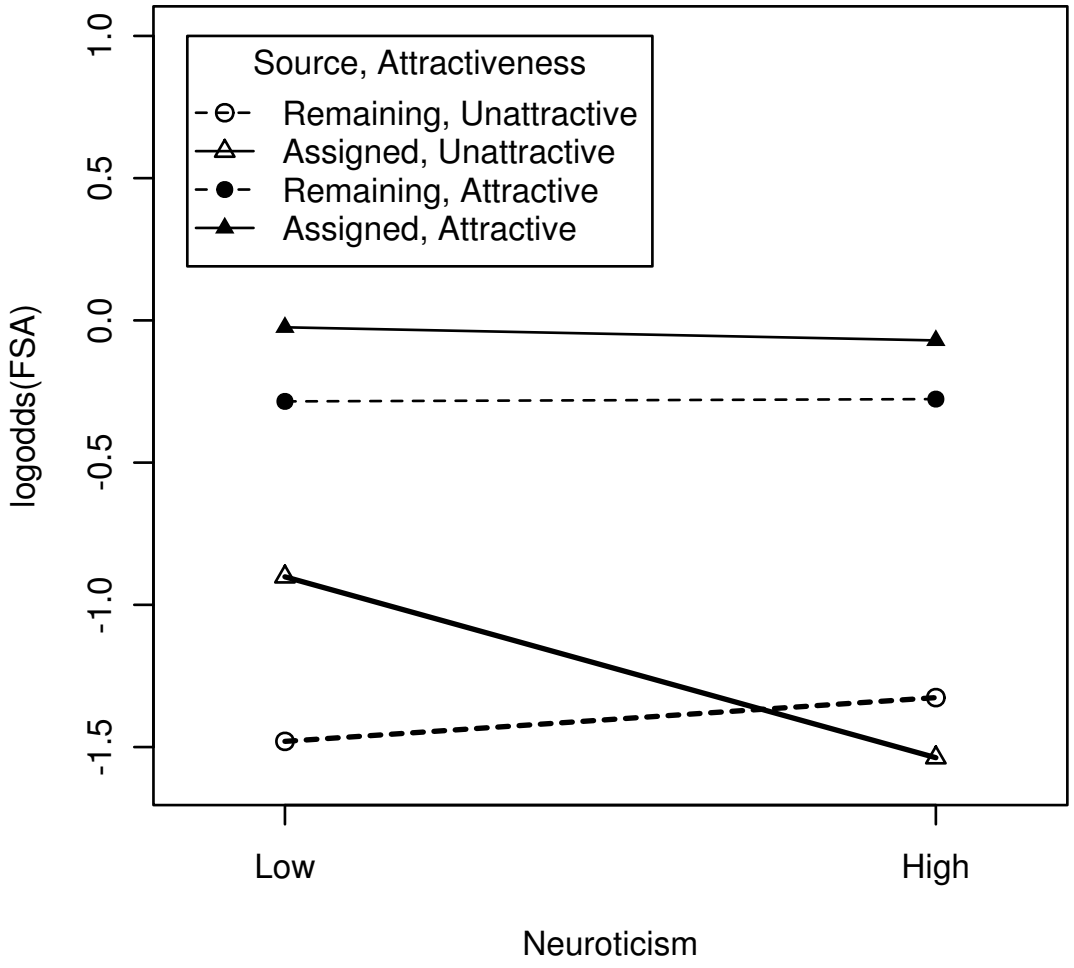

Figure 2. Prediction of false self-ascription from item source, item attractiveness, and neuroticism. Higher logodds(FSA) of assigned, compared with remaining items signify self-infiltration. The third-order interaction depicted is only marginally significant.

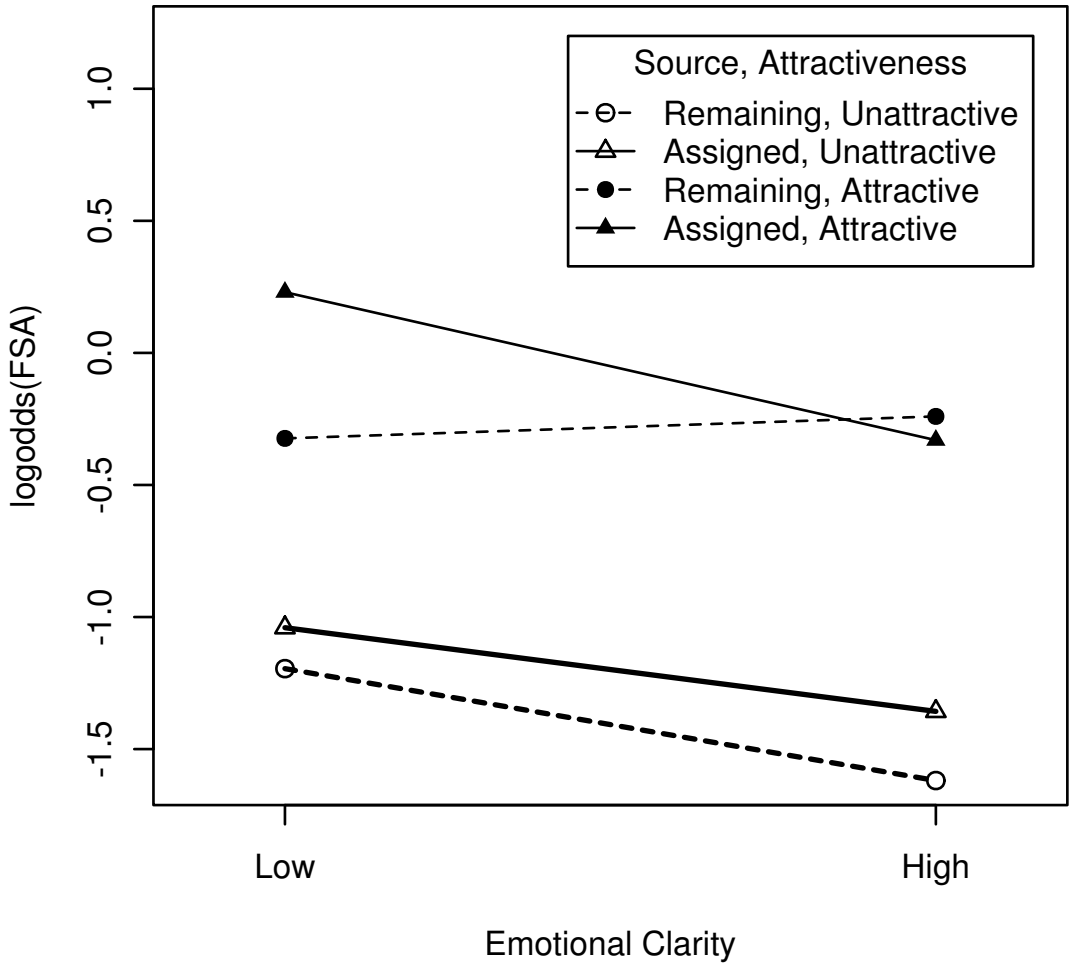

Figure 3. Prediction of false self-ascription from item source, item attractiveness, and clarity of feelings. Higher logodds(FSA) of assigned, compared with remaining items indicate self-infiltration. The third-order interaction depicted is only marginally significant.

The Consistency of Preferences as a Measure of Self-Access

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In Study 1 of the present paper, data from the second paper of the present thesis, entitled "Self-infiltration as a measure of self-access: A replication study" are reanalyzed with respect to a different hypothesis. Because the data stem from the same data collection, the descriptions of some measurement instruments (ACS-90, PANAS), and the first three paragraphs of the procedure are identical in the two studies.

Abstract

According to PSI theory (Kuhl, 2000), self-access may be measured by individual differences in self-infiltration, i.e. in the false self-ascription of assigned activities. The theory suggests that subjects experiencing high negative affect and having low self-regulatory skills (i.e. subjects with a low action orientation) suffer from self-access deficiencies. The current research explored whether preference consistency depends on the same antecedents as self-infiltration and may therefore serve as an alternative indicator of self-access. In three studies, preference consistency regarding different objects (activities, animals, and job-related activities), and action orientation were measured. Negative affect was measured (Studies 1 and 2), or manipulated (Study 3). In Study 2, as expected, the choices of subjects with higher negative affect were less consistent with attractiveness ratings. However, data from Studies 1 and 3 did not converge with this result. Moreover, action orientation did not emerge as a moderator of the effect of affect on self-access. The results indicate that the preference consistency measure cannot serve as a replacement for the self-infiltration measure used in previous research. Preference consistency and self-infiltration may measure complementary facets of the self-access construct.

Keywords: PSI theory, consistency, preference, self-access, affect, action orientation

The Consistency of Preferences as a Measure of Self-Access

Compared with all other species, human beings have the unique ability to reflect on their own opinions and to ask the question: How well do the opinions I hold agree with reality? How true are they? Moreover, humans may even ask themselves whether the actions and objects they prefer, or the goals they strive for, are in concord with their own true minds. This is a question of knowing one's preferences (cf. Kuhl & Beckmann, 1994), in other words, a question of self-access in judgement and choice. A number of theories have addressed the question of whether the goals that people select fit them. The most prominent of these theories are the self-concordance model (Sheldon & Elliot, 1999), motive disposition theory (McClelland, Koestner, & Weinberger, 1989), and personality systems interaction theory (PSI theory; Kuhl, 2000).

Self-Access in Goal Selection

Sheldon (2008) defined self-concordance as the "extent to which a person's goals correctly represent their deeper personality dispositions, needs, and motives" (Sheldon, 2008, p. 468). Subjects who managed to select their goals in accordance with their "trait levels of personality" (Sheldon, 2008, p. 468) reported better subjective well-being (Sheldon & Elliot, 1999; Sheldon & Kasser, 1995), put more effort in their projects, and were more likely to attain their goals (Sheldon & Elliot, 1998). In these studies, self-concordance was measured as the perceived locus of control (PLOC) known from self-determination research (Deci & Ryan, 2000). Subjects rated to what extent their goal-striving was based on external or internal reasons.

Sheldon (2008) admitted that, when measuring self-concordance through self-reports, one cannot be sure whether self-concordance is anything but illusory. In other words, the possibility that an internally regulated goal is in fact self-discordant cannot be ruled out. Therefore, an objective—as opposed to self-reported—measure of a person's "trait levels of personality" (Sheldon, 2008) is an advantage when measuring a goal's self-concordance.

Such an objective measure of motivational traits is widely used in motive disposition research (McClelland, 1985; Schultheiss & Brunstein, 2010): the Picture Story Exercise (PSE;

McClelland et al., 1989) measure of implicit motives. The PSE assesses individual differences in the needs for achievement, power, and affiliation. One major strand of motive disposition research concerns motive-goal congruence (for a summary, see Brunstein, 2010), the congruence between motives measured using the PSE and self-reported goals. Motive-goal congruence—like self-concordance—has been attributed to the ability to derive concrete goals from more abstract motives (Brunstein, 2010; Schultheiss, Patalakh, Rawolle, Liening, & MacInnes, 2011). Results of motive-goal congruence research also parallel results from self-concordance research in that motive congruence predicts subjective well-being and life satisfaction (e.g. Hofer, Busch, Bond, Li, & Law, 2010).

The notions of self-concordance (Sheldon, 2002) and motive-goal congruence (Brunstein, 2010) both conceptualize a person's access to trait levels of personality underlying his or her goals, i.e. self-access as defined above. PSI theory (Kuhl, 2000) focuses—more than the theories just described—on the analysis of processes involved in self-access.

Self-Access as Access to Intuitive Self-Representations

PSI theory (Kuhl, 2000, 2001) explains the control of volitional action through the interaction of four memory systems. The theory mainly makes predictions for two classes of outcome variables: the regulation of action initiation on the one hand and self-access on the other hand. Action initiation is explained through the interplay of two memory systems: *intention memory* (IM) and *intuitive behaviour control* (IBC). According to the theory, goals or intentions are stored in IM, waiting to be translated into action by being transferred to IBC, the system that mediates action execution. Self-access, on the other hand, is explained through the interplay of *extension memory* (EM) and the *object recognition* (OR) system. According to the theory, a person's access to his or her implicit self-representations, including preferences or motives, depends on the relative activation of EM and OR. Kuhl (2000, 2001) argued that the "self" is so complex a structure that its contents can only be perceived when a person is cognitively tuned to holistic, intuitive information processing. EM activation corresponds to a holistic, intuitive cognitive mode, while OR activation corresponds to an analytic, isolated representation of objects and experiences. When EM cannot be activated—in other words,

when holistic, intuitive processing is not possible—self-access is hindered.

Whether an intention is transferred from IM to IBC and whether EM or OR is activated more depends, according to the theory, on changes in a person's affective state. Kuhl (2000, 2001) argued that to execute an intention—at least a difficult one—an increase in positive affect is necessary. The activity of EM, and thus self-access, on the other hand, relies on negative affect in that a persistent high negative affect blocks EM activity and thus the perception of one's own needs and preferences. Thus, when negative affect is high, its down-regulation is a necessary condition for self-access.

Kuhl and Kazén (1994) developed a paradigm to test the latter hypothesis in a laboratory setting. In the *self-infiltration paradigm*, subjects form intentions about simple office activities (e.g. sharpening a pencil, watering a plant). The source of intentions varies in that they may be chosen by the subjects themselves (self-chosen intentions) or assigned to them by the "boss" (other-assigned intentions). In a subsequent unexpected memory task, subjects are asked to indicate which activities they chose themselves. Hampered self-access is indicated by a tendency to mistakenly self-ascribe activities assigned by the boss (so-called *self-infiltration*). As predicted by PSI theory, subjects who were high in negative affect and, at the same time, had poor affect-regulation skills (i.e. state-oriented subjects), made more self-infiltration errors than subjects with a low negative affect, or subjects with good affect regulation skills (i.e. action-oriented subjects, Kuhl & Kazén, 1994). This result was replicated in similar studies using computer-based data collection (Baumann & Kuhl, 2003; Kazén, Baumann, & Kuhl, 2003).

A New Way of Measuring Self-Access

In all approaches outlined above, self-access may be conceptualized as a person's ability to perceive or act according to his or her trait levels of personality. Thus, what goals people select is thought to depend, in part, on a trait-like foundation. According to all three theories people differ in their ability to use that foundation for selecting their goals.

Self-access, as conceptualized in PSI theory, differs in some important respects from self-access as described by the self-concordance model or motive disposition theory. Unlike

the other two theories, PSI theory offers a causal explanation for self-access and its failure. Moreover, in PSI theory self-access is not confined to three classes of motives, as is motive disposition theory. For these reasons PSI theory can be considered, in some respects, a more general and more comprehensive approach to the investigation of self-access.

Regarding the measurement method, the self-infiltration paradigm does not rely on personal goals that are generated ad hoc, but uses standardized materials, which ensures better control of possible confounding variables. It is questionable, though, whether the measure of self-other distinction used in the self-infiltration paradigm does fit the definition of self-access given above. In the self-infiltration paradigm (e.g. Baumann & Kuhl, 2003), subjects are asked to discriminate between self-chosen and other-assigned activities. The accuracy with which one's preferences are perceived is neither measured nor is it an advantage in the discrimination task.[1]

Given the advantages of the conception of self-access based on PSI theory, we propose an alternative measure of self-access that is both more economical than the self-infiltration paradigm and is hypothesized to measure self-access as defined above in a more straightforward fashion. In this research, we develop and test *preference consistency* as a measure of self-access in the context of PSI theory.

Why Preference Consistency Might Indicate Self-Access

In economic theory, preference consistency has been conceptualized as a transitivity of choices. Transitivity is a fundamental axiom of most prescriptive choice theories (Regenwetter, Dana, & Davis-Stober, 2011). If a person prefers object A to object B and, at the same time, object B to object C, then—according to the axiom of transitivity—the person is expected to prefer object A to object C. Researchers in economics and economic psychology have asked the question whether humans violate transitivity when making choices and consequently lack rationality. Early research (e.g. Davis, 1958; Tversky, 1969) found that people violated transitivity when making complete pairwise comparisons of a range of objects (e.g. gambles). More recent studies, however, support the conclusion that data are consistent with transitive preferences, provided appropriate statistical models (e.g. mixture models) are

applied (Birnbaum & Schmidt, 2008, 2010; Regenwetter et al., 2011).

Most of the existing preference consistency research has dealt with the suspected violation of transitivity in humans in general, neglecting individual differences. Only in a small number of studies preference consistency has been defined as a variable that differs between individuals and depends on the subjects' traits or states (Lee, Amir, & Ariely, 2009; Nordgren & Dijksterhuis, 2009). In the current research, we have used preference consistency as an individual difference variable. Therefore, discussions on whether humans are generally transitive or intransitive are of minor relevance here.

Lee et al. (2009) tested the hypothesis that emotional processing enhances self-access, as indicated by preference consistency. In a series of experiments, Lee et al. asked subjects to make pairwise preference comparisons regarding a number of consumer products. The amount of emotional processing was manipulated using various methods. In one experiment, items were presented either as pictures or words, with pictures being more likely, according to Lee et al., to be emotionally processed than words. In another experiment, cognitive capacity was limited by a secondary task, which was thought to lead to more emotion-based processing compared with a control group. Subjects who processed stimuli in a more emotional manner made fewer transitivity errors than subjects who processed stimuli more cognitively.

In a similar paradigm, Nordgren and Dijksterhuis (2009) showed that the type of processing used in a preference task may influence preference consistency. Subjects had to rate a number of Chinese ideograms, both at the beginning and end of a 50-minute interval. Subjects who were told to make their judgements deliberately were less consistent over time than subjects who were told to "make quick decisions based on a gut feeling" (p. 40).

Both Lee et al. (2009) and Nordgren and Dijksterhuis (2009) employed a dual-process model. They held that a more emotional or intuitive kind of processing enhances preference consistency, compared with more cognitive or reflective processing. Furthermore, Lee et al. held that emotional processing "provide[s] individuals with a reading of their preferences", in other words that emotional processing enhances self-access.

The self-access hypothesis in PSI theory (Kuhl, 2000, 2001) is formulated in dual-process terms, too. According to Kuhl, access to implicit self-representations—i.e.

self-access—depends on the ability of intuitive, holistic processing. As preference consistency is predicted—in theory—by variables similar to those that predict self-access, the hypothesis that preference consistency might be an indicator of self-access seems warranted.

In classical test theory, the internal consistency of a number of items indicating the same construct, often formalized as Cronbach's α, signifies reliability, i.e. accuracy of measurement. In a similar vein, intact self-access, fostered by intuitive processing, may lead to more reliable preference decisions and therefore to a higher internal consistency of preferences. Relying on implicit self-representations may provide a solid basis for decision-making, thus reducing the need to take guesses or decide at random, and enabling more reliable decisions to be made. We therefore hypothesize that preference consistency may be a measure of self-access as defined in PSI theory.

The Present Studies

State-oriented subjects experiencing negative affect are known to have a self-access deficit, as indicated by increased self-infiltration (Baumann & Kuhl, 2003; Kazén et al., 2003). The aim of the present research was to conceptually replicate these findings while substituting measures of preference consistency for the self-infiltration measure. The above-mentioned self-access effect has been well-replicated and there is—as we have shown—a good case for using preference consistency as a measure of self-access. Therefore, in the present studies, we attempt to show that preference consistency is lower in state-oriented subjects experiencing high negative affect than in action-oriented subjects or subjects experiencing low negative affect.

Self-access measures. In the present studies, two kinds of preference consistency measures were used as indicators of self-access: the inconsistency between attractiveness ratings and subsequent choices (*rating-choice inconsistency*) on the one hand, and the *number of transitivity violations* on the other hand (see Lee et al., 2009). To calculate rating-choice inconsistency, the expected choice for each trial is determined based on item attractivenesses. More attractive items are expected to be preferred to less attractive items. Rating-choice inconsistency is calculated as the number of choices contradicting the expectation. Therefore,

rating-choice inconsistency is based on a comparison of two separate preference measures, i.e. of attractiveness ratings and choices.

The number of transitivity violations, by contrast, is a measure of inconsistency within a number of binary preference decisions. For a small number of items, e.g. 10, subjects are requested to make complete pairwise preference decisions. The measure is calculated as follows: All possible permutations of the items (e.g. A, B, and C) of length three are generated. For each permutation, it is determined whether the first pair (i.e. A versus B), the second pair (i.e. B versus C), and the pair consisting of the leftmost and rightmost items (i.e. A versus C) were preferred in the same direction (e.g. $A \succ B$, $B \succ C$, and $A \succ C$). Each combination that does not satisfy this condition (e.g. $A \prec C$) is considered a violation of transitivity. The number of transitivity violations is counted for each subject.

In the present studies, rating-choice inconsistency and number of transitivity violations were used as complementary measures of inconsistency, each indicating the amount of discrepancy between or within preference measures of the same objects.

Choice of materials. The self-infiltration paradigm (Kuhl & Kazén, 1994) differs from other self-access measures in that it replaces personal goals—as used in self-concordance (Sheldon, 2002) and motive-disposition (Brunstein, 2010) paradigms—with standardized items that remain constant for all participants. A similar approach was taken in the current research. Materials were chosen to meet three requirements: They needed, firstly, to be viewed as self-relevant, subjectively important choice options; secondly, to lack strong previous preferences; and, thirdly, to be sufficiently complex to support ecological validity. Materials were varied between the three studies to test hypotheses across different contexts.

Overview of studies. In Study 1, the prediction of rating-choice inconsistency by self-reported current affect and action orientation was tested using office activities. Study 2 tested the same hypothesis using animal photographs and, in addition, included a transitivity measure. Study 3 tested the same hypothesis using an experimental approach. Affect was manipulated and preference consistency was measured in the context of vocational choice.

Study 1

This study was correlational in nature and tested the hypothesis that state-oriented subjects with a high level of negative affect exhibit less consistency between their attractiveness ratings and their choice of office activities than action-oriented subjects or subjects in a state of low negative affect.

Method

Participants. Data were collected from $N = 76$ subjects (61 women, 15 men) recruited at the University of Zurich through an internet-based participant recruitment system. Subjects were $M = 23.5$ ($SD = 6.8$) years of age. Seventy subjects (92%) were students. Subjects chose between monetary (CHF 15.–, approximately € 12.50; 24 subjects) and course credit compensation (52 subjects). Three subjects were excluded from the analyses because their attractiveness ratings lacked variance (see below).

Materials[2]

Instructions and office activities. Instruction texts were based on the instructions used in Baumann and Kuhl (2003). Forty-eight office activities were taken from a recent item set used in PANTER research (C. Lüdecke, personal communication, June 28, 2010) and adapted slightly to Swiss language usage. Sample items are "stamping a letter", "hanging up a calendar" (all two-word expressions in German).

Affective state. Affect was measured using the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988; German translation by Krohne, Egloff, Kohlmann, & Tausch, 1996). Subjects are shown 10 negatively and 10 positively valenced adjectives (e.g. "interested", "distressed", "excited") and are asked to choose one of the five verbal anchors for each item, ranging from *very slightly or not at all* to *extremely*. In the present study, subjects were asked to indicate how they "feel right now". Internal consistency for positive affect (Cronbach's $\alpha = .87$) and negative affect (Cronbach's $\alpha = .86$) was good.

Action orientation. A 24-item Action Control Scale (ACS-90; Kuhl, 1994) was used to measure demand-related (AOD) and failure-related (AOF) action orientation. For each item, subjects are required to choose either alternative A or alternative B. An example of an

item for AOD is "When I know I must finish something soon: A. I have to push myself to get started. B. I find it easy to get it done and over [sic; authors' note] with." An example of an item for AOF is "When I have lost something that is very valuable to me and I can't find it anywhere: A. I have a hard time concentrating on something else. B. I put it out of my mind after a little while." (translations from Kuhl, 1994). In both examples, alternative B indicates action orientation. Internal consistency was adequate for both AOD (Cronbach's $\alpha = .73$) and AOF (Cronbach's $\alpha = .72$).

Procedure. Data collection took place as part of an attempt to replicate a study on self-infiltration by Baumann and Kuhl (2003, Study 1). Subjects were tested individually in a room without daylight. The experimenter was present throughout data collection, separated from the subject by a divider. Data were collected using an IBM-compatible personal computer running a Psychtoolbox (Version 3; Brainard, 1997) script. All instructions were presented on the computer screen. Subjects responded using the computer mouse.

The purpose of the study—as presented to subjects—was "to find out how office clerks organize their work, plan actions and how they feel while doing so". Subjects were told to imagine they were an office clerk about to perform a variety of activities. Their affective state was measured using the PANAS. Next, the 48 office activities were presented sequentially in a predefined random order. Subjects indicated how attractive they judged each activity to be on a 19-point scale ranging from -9 (*extremely unattractive*) to $+9$ (*extremely attractive*).

In the two following tasks, subjects were assigned half of the activities and, in addition, chose half of the activities. The order of assignment and choice tasks was balanced between participants. In the choice task, subjects were presented with lists of six activities of which they had to choose three. In each trial, subjects could select and deselect each activity presented ad libitum, and then confirm their choice, given that exactly three activities were selected.

The attractiveness of items in each list of six was controlled by drawing the items for each list—without replacement—from the same quartile of attractiveness, based on the subject's earlier ratings. Thus, four attractiveness levels were created. Item lists were presented in a predefined random order. A detailed account of the assignment task is not

given, as it is not relevant to the hypotheses tested here.

Following the choice and assignment tasks, subjects answered the ACS-90. The remaining tasks are not relevant to the hypotheses tested here and are therefore not reported. Finally, subjects were thanked, debriefed and received compensation.

Results

Self-access measure. For each list of six items, the median rating was calculated for each subject. Items scoring below the median were expected not to be chosen by the subject while items scoring above the median were expected to be chosen. For items equalling the median, no prediction was made. The number of inconsistent choices was calculated as the number of choices contradicting the expectation. A low number of inconsistent choices was assumed to indicate a high level of self-access. As the number of items taken into account differed between subjects, the number of items equalling the median was included as one of the control variables.

Prediction of self-access. Three subjects whose mode value of attractiveness ratings had a frequency higher than 24—i.e. who gave the same rating to more than 50% of activities—were excluded from the analyses because of a lack of variance. Table 1 shows the means, standard deviations and zero-order correlations of the main variables measured in Study 1.

The influence of several control variables on the number of inconsistent choices was tested using a linear regression model. Control variables included the duration of rating and choice tasks, type of compensation (monetary, course credit), mean and standard deviation of ratings, and number of items scoring on the median. Variables not contributing to the model were excluded using stepwise AIC selection (see Venables & Ripley, 2002). The only predictor remaining in the model was the number of items on the median. Subjects with more items on the median made a smaller number of inconsistent choices, $b = -0.54$, $SE = 0.08$, $t = -6.74$, $p < .001$. This variable was included in the following analysis.

The main hypothesis was tested in a second linear regression model. The number of inconsistent choices was regressed on the number of items on the median, negative affect,

AOF, and the Negative Affect × AOF interaction. For this analysis, negative affect and AOF were standardized. As above, variables were excluded from the model using stepwise AIC selection. This was the case for the interaction, $F(1,68) = 0.43$, $p = .515$, negative affect, $F(1,69) = 0.39$, $p = .535$, and AOF, $F(1,70) = 0.80$, $p = .375$. The only variable remaining in the model was number of items on the median (statistics see above). Thus, negative affect, AOF, or their interaction did not predict the number of inconsistent choices.

Insert Table 1 about here

Discussion

Contrary to expectations, neither negative affect, nor action orientation, nor their interaction predicted self-access as measured by rating-choice consistency. Thus, based on the current data, it is questionable whether preference consistency does measure self-access as conceptualized in PSI theory. It should be noted, however, that the data in Study 1 originated from the self-infiltration paradigm, which is why they may not be perfectly suited for measuring consistency. Firstly, the attractiveness within each set of items to be chosen was limited as the items on each list presented to subjects were restricted to one attractiveness quartile. Secondly, Study 1 only included a measure of rating-choice consistency but no measure of transitivity. In Study 2, the limitation on the variance in the choice task was removed, and the number of intransitive choices was included as a second measure of self-access.

Furthermore, self-reported life stress was included in Study 2 as an alternative measure of negative affectivity. In Study 1, we hypothesized an interaction between AOF—a trait—and affective state. As this is a correlational study, we are dealing with long-term rather than short-term processes, so it is plausible that more long-term sources of negative affect—i.e. life stress—might hinder self-access to a larger extent than current negative affect does. In a study by Baumann, Kaschel, and Kuhl (2005), life stress, together with AOF, predicted congruence of implicit versus explicit achievement motives, with state-oriented subjects under high stress being more incongruent than action-oriented subjects or subjects under low stress. Motive

congruence may be regarded as a measure of self-access, like the consistency measure used in the current research. Therefore, to test the effect of long-term sources of negative affect on self-access, a measure of life stress was included.

Study 2

In Study 2, as in the previous study, participants were asked to give attractiveness ratings and make preference decisions to measure preference consistency. Photographs of little-known animals were used as stimuli. These stimuli were expected to evoke affective reactions while at the same time being relatively novel to subjects. In addition to rating-choice inconsistency, the number of transitivity violations was calculated as an additional measure of inconsistency (Lee et al., 2009). Inconsistency was expected to depend on both the AOF $\times$ Negative Affect and the AOF $\times$ Life Stress interaction.

Method

Participants. Data were collected from $N = 137$ German-speaking subjects at two points in time. Subjects were recruited by email. Thirty subjects did not take part at Time 2, which is why no trait measures were available from them. These subjects were excluded from all analyses. In addition, two subjects were excluded because they gave identical answers to all questions in the attractiveness ratings. The resulting sample consisted of $n = 105$ subjects (71 women, 34 men) aged $M = 36.3$ years ($SD = 16.7$). Thirty subjects held a Bachelor's or Master's degree, 75 subjects did not have a university degree. Fourteen (13%) of the subjects were psychology undergraduates or graduates.

Materials

Animal Photographs. Nine high-resolution colour images of animals were found using internet search engines. One or two examples were chosen from each of the six animal classes included (Aves, Mammalia, Reptilia, Amphibia, Actinopterygii, Chondrichthyes).[3] Images were cropped to a square shape while centring the animal and removing irrelevant background details.

Affective state. Affective state was measured using the Positive and Negative Affect Schedule (Watson et al., 1988, see Study 1). Reliability was good (Cronbach's $\alpha = .84$ for

both scales).

Action orientation. The 24-item Action Control Scale (ACS-90; Kuhl, 1994, see Study 1) was administered to measure demand-related (AOD) and failure-related (AOF) action orientation. Reliability was sufficient for AOD ($\alpha = .70$) and AOF ($\alpha = .75$).

Life stress. The two life stress subscales of the Volitional Components Inventory (VCI; Kuhl & Fuhrmann, 1998) were used to measure demand-related and failure-related life stress. Each subscale consists of four items. On a scale ranging from 1 (*not at all*) to 4 (*very much*), subjects rate to what extent the statements reflect their current situation. Examples for the demand-related and threat-related life stress scales are: "My current life circumstances are very tough." and "I have many painful experiences to cope with." Reliability was good for demand-related (Cronbach's $\alpha = .81$) and failure-related (Cronbach's $\alpha = .82$) life stress.

Procedure. Data collection was internet-based and controlled by an Inquisit (Version 3) script. Preference data and other state variables were measured at Time 1, followed by collection of trait data approximately 7 days later.

At Time 1, subjects were told the purpose of the study was to research the influence of personality factors on mundane decisions. These decisions and judgements, subjects were told, would concern animals living in the wild, because individuals differed considerably in their evaluation of such animals. Subsequently, the PANAS was administered to measure current affect. Next, subjects were asked to indicate how much they liked a number of animals on a scale from 1 (*not at all*) to 7 (*very much*). Photographs of animals were displayed sequentially in a random order that was unique to each subject. Each colour photograph was shown together with the animal's name, which was shortened, where necessary, to one word. Subjects responded by clicking on one of the rating scale points.

Following the rating, all 36 possible pairs of animals were displayed, one pair at a time, in a random order that was unique to each subject. For each pair, subjects were asked to indicate which of the two animals they "liked better" by clicking on the respective picture. Subjects were instructed to "take their time" and indicate their personal preference. Finally, they were thanked and asked to maintain silence about the details of the study. All tasks were self-paced.

Subjects were invited by email to take part in the second measurement session. The session consisted of the ACS-90 and the two VCI subscales. After subjects had finished, they were thanked and fully debriefed.

Results

Self-access measures. Two measures of preference consistency were calculated to serve as indicators of self-access: rating-choice consistency and number of transitivity violations. To calculate rating-choice consistency, the decision for each pair of options was predicted based on the difference in their attractiveness. The item rated as being more attractive was expected to be preferred. If both items were rated as equally attractive, no prediction was made. Inconsistency between rating and choice was calculated as the number of decisions that contradicted the expectation.

To calculate the number of transitivity violations, all possible item permutations of length three were generated, and the number of permutations not satisfying the transitivity condition ($A \succ B$, $B \succ C$, and $A \succ C$) was determined. The two self-access measures were significantly correlated, $r = .26$, $t(103) = 2.68$, $p = .004$ (one-sided). Table 2 shows the means, standard deviations and zero-order correlations of the main variables measured in Study 2.

Rating-choice inconsistency. The number of inconsistent choices ranged from 0 to 12 ($M = 2.89$, $SD = 2.58$, $Mdn = 2$) and was positively skewed ($g_1 = 1.21$). To control for the number of item pairs about which no prediction could be made regarding choice, the number of pairs with equal attractiveness was used as one of the control variables. Data were analysed using negative binomial regression. AOF, negative affect, and life stress were standardized for these analyses.

In a first analysis, the effect of control variables on the number of inconsistent choices was tested. The number of inconsistent choices was regressed on the number of pairs with equal attractiveness, as well as the mean and standard deviation of the subject's rating. Variables not contributing to the model were excluded using stepwise AIC selection. This was the case for mean rating, $\chi^2(1) = 0.79$, $p = .376$. Subjects with a lower number of pairs of

equal attractiveness—i.e. for whom fewer pairs were taken into account—, $b = -.10$, $SE = 0.024$, $z = -4.25$, $p < .001$, and with a smaller standard deviation of ratings, $b = -0.41$, $SE = 0.187$, $z = -2.20$, $p = .029$, made more inconsistent choices. Therefore, the number of pairs with equal attractiveness and the standard deviation of ratings were included as control variables in the following analysis.

To test the main hypothesis, the number of inconsistent choices was regressed on the number of pairs with equal attractiveness, standard deviation of ratings, negative affect, failure-related action orientation (AOF), and the Negative Affect $\times$ AOF interaction. Using stepwise AIC selection, predictors whose deletion did not cause any deterioration of the model were removed from it. This was the case for the interaction, $\chi^2(1) = 0.04$, $p = .845$. Number of pairs with equal attractiveness, $b = -0.10$, $SE = .023$, $z = -4.41$, $p < .001$, and negative affect, $b = 0.20$, $SE = 0.080$, $z = 2.52$, $p = .012$, significantly predicted inconsistency, while standard deviation of ratings, $b = -0.34$, $SE = 0.190$, $z = -1.77$, $p = .077$, and AOF, $b = 0.16$, $SE = 0.090$, $z = 1.82$, $p = .070$, emerged as only marginally significant predictors. Subjects with fewer equally attractive pairs and higher negative affect made more inconsistent choices. Subjects with a high AOF and lower standard deviations of ratings tended to be more inconsistent. According to a likelihood ratio test, the initial negative binomial model reported was superior to an otherwise equivalent Poisson model, $\chi^2(1) = 37.83$, $p < .001$.

In a parallel analysis, the effect of life stress and AOF on self-access was tested. Using a negative binomial model, the number of inconsistent choices was regressed on the number of pairs with equal attractiveness, the mean as well as the standard deviation of the nine ratings, threat-related life stress, AOF, and the Life Stress $\times$ AOF interaction. Using stepwise AIC selection, predictors whose deletion did not cause any deterioration of the model were removed from it. This was the case for the interaction, $\chi^2(1) = 0.00$, $p = .971$, and AOF, $\chi^2(1)1.73$, $p = .188$. According to the resulting model, subjects with fewer pairs of equally attractive items—i.e. with more pairs taken into account—, $b = -0.10$, $SE = .023$, $z = -4.47$, $p < .001$, and subjects with smaller standard deviations of ratings, $b = -0.51$, $SE = 0.193$, $z = -2.63$, $p = .009$ made more inconsistent choices. In addition, subjects with high levels of threat-related life stress, $b = 0.14$, $SE = 0.083$, $z = 1.65$, $p = .099$, tended to be more

inconsistent. The initial negative binomial model was superior to an otherwise equivalent Poisson model, $\chi^2(1) = 27.09$, $p < .001$.

Transitivity violations. The number of transitivity violations ranged from 0 to 24 ($M = 2.91$, $SD = 4.58$, $Mdn = 0$) and was positively skewed ($g_1 = 2.11$). A large number of subjects ($n = 60$; 57%) did not make a single violation of transitivity, which resulted in a zero-inflated distribution. The data were therefore analysed using zero-inflated negative binomial (ZINB) regression.

In a first analysis, the number of transitivity violations was regressed on the mean as well as the standard deviation of ratings for each subject. Using stepwise AIC selection, the mean rating was excluded from the model, $\chi^2(2) = 0.93$, $p = .625$. Subjects with a lower standard deviation in their ratings tended to make more transitivity violations, $b = -0.37$, $SE = 0.20$, $z = -1.90$, $p = .058$. This variable was included in the following analysis.

For the main hypothesis test, the number of transitivity violations was regressed on the standard deviation of ratings, negative affect, failure-related action orientation (AOF), and the Negative Affect $\times$ AOF interaction. Variables not contributing to the model, based on stepwise AIC selection, were removed from the model. This was the case for the interaction, $\chi^2(2) = 0.44$, $p = .802$, action orientation, $\chi^2(2) = 1.03$, $p = .598$, and negative affect, $\chi^2(2) = 2.12$, $p = .346$. The only predictor approaching significance was the standard deviation of ratings within subjects (statistics see above).

Using the same procedure, the number of transitivity violations was regressed on the standard deviation of ratings for each subject, failure-related life stress, AOF, and the Life Stress $\times$ AOF interaction. Based on stepwise AIC selection, variables not contributing to the model were removed. This was the case for the interaction, $\chi^2(2) = 2.08$, $p = .353$, and AOF, $\chi^2(2) = 1.30$, $p = .522$. Thus, neither AOF nor the AOF $\times$ Life Stress interaction predicted transitivity significantly. Subjects with higher standard deviations in their ratings tended to make fewer transitivity violations, $b = -0.39$, $SE = 0.20$, $z = -1.95$, $p = .052$. More importantly, subjects experiencing higher threat-related life stress were less likely to be fully transitive, $b = -0.17$, $SE = 0.077$, $z = -2.17$, $p = .030$.

The initial ZINB model was tested against a negative binomial model without zero

inflation using the Vuong test for non-nested models. The zero-inflated model was superior to the model without zero inflation, $Z = -5.33$, $p < .001$. In addition, the ZINB model was tested against a zero-inflated Poisson model using a likelihood ratio test. The ZINB model was again superior to the alternative model, $\chi^2(1) = 31.28$, $p < .001$. Therefore, the ZINB model is considered the most appropriate of the candidate models.

Insert Table 2 about here

Discussion

Study 2 served the purpose of testing the self-access hypothesis in several ways. Two measures of consistency, rating-choice consistency and number of transitivity violations, were used as measures of self-access. The prediction of self-access from current negative affect on the one hand and from threat-related life stress on the other hand was tested. In addition, these effects were expected to be moderated by AOF.

Results were partially consistent with predictions. As expected, subjects in a state of high negative affect were more prone to make choices that were inconsistent with prior ratings. In addition, subjects experiencing a high level of threat-related life stress were less likely to be fully consistent. However, neither in the case of rating-choice consistency nor of transitivity was the influence of affect or life stress moderated by AOF. Action-oriented subjects tended to make decisions that were more consistent with ratings, compared with state-oriented subjects.

The first two studies were correlative in nature. As subjects' negative affect was generally low—e.g., in Study 2, $M = 15.7$ on a scale ranging from 10 to 50—it seemed advisable to test the hypotheses in an experimental design in which a more pronounced negative affect was induced. Study 3 featured an experimental design and tested the hypothesis in the highly self-relevant context of vocational choice.

Study 3

Stable vocational interests develop from adolescence to early adulthood (Low, Yoon, Roberts, & Rounds, 2005). In Study 3, adolescent participants, who were in the process of

choosing their careers, made liking judgements and decisions concerning job-related activities. The judgements and decisions made in this study may therefore be assumed to have been particularly self-relevant to participants and thus well-suited to examining self-related processes such as self-access. In the study, negative versus neutral affect was manipulated using a story reading and writing task. The effect of experimentally induced negative affect on consistency was tested, as well as a moderating effect of action orientation.

In addition, we investigated the question whether stimulus modality affected self-access. Research has shown that self-access profits from a pictorial, as opposed to a verbal, presentation of stimuli (Lee et al., 2009), as well as from vividly imagining goal-striving, compared with the mere verbal representation of a goal (Job & Brandstätter, 2009; Schultheiss & Brunstein, 1999). These results are in line with Kuhl's (2001) assumption that intuitive processing, which is typical of extension memory, is characterized by "pictoriality, and other aspects of a close connection to concrete sensorimotor experiences" (p. 626, own translation). Therefore, in the current study, stimuli were presented either as pictures or as words. Self-access—and thus consistency—was expected to be facilitated by a pictorial presentation.

Method

Participants. The sample consisted of $N = 106$ students (17 men, 88 women)[4] at a high school in southern Germany, who were between 15 and 21 years ($M = 17.7$, $SD = 1.2$) of age. Subjects were recruited in the classroom by their teachers.

Materials

Vocation-related stimuli. Vocation-related line drawings were chosen from the non-verbal test of vocational interests developed by Proyer (2007). The original test comprises 60 stimuli, 10 for each of the six dimensions of the RIASEC model (Holland, 1997). For the present study, two sets of 12 stimuli each were chosen. To ensure sufficient variability in stimuli content, each set included two stimuli per RIASEC dimension. All drawings depicted a person at work. For each of the chosen stimuli, an action description was generated as a verbal counterpart to the pictures (e.g. "baking bread", "entering data"; all two-word expressions).

Affect manipulation stimuli. According to a meta-analysis by Westermann, Spies, Stahl, and Hesse (1996), the presentation of films or stories with emotional contents, accompanied by an instruction to imagine the situation and get emotionally involved, is among the most effective procedures for experimental mood induction. Therefore, a story with negative emotional content and a control story with neutral to positive content were developed.

In the negative story, a severe nuclear power plant failure in the region of southern Germany was reported, which presumably included a nuclear meltdown. The people affected were advised to prepare themselves for evacuation. The story was furnished with one colour photograph showing a nuclear power plant and two further photographs showing anti-nuclear activists with posters carrying radiation warning signs. One poster read "I AM SCARED".

The neutral story reported that a solar power plant in southern Spain had entered into service. As a result, the story said, a Spanish nuclear power plant had been shut down for good. Energy production was described as emission-free and low-risk, with positive effects on "humans, animals, and nature". The story was furnished with three colour photographs showing a solar power plant, the sun shining onto a solar panel, and a young, smiling girl surrounded by sunflowers.

Affective state. The Short Scales for the Measurement of Positive Activation, Negative Activation, and Valence (PANAVA-KS; Schallberger, 2005) were used as a measure of state affect. The scales consist of 10 bipolar adjective scales (e.g. *unhappy*, *happy*). For each item, subjects indicate on a 7-point scale whether the left-hand or the right-hand item better describes their current state. As our hypothesis specifically refers to negative affect, only the negative activation subscale was used for the manipulation check. Reliability of the negative activation scale was acceptable (Cronbach's $\alpha = .74$ at baseline and $\alpha = .71$ post manipulation).

Action orientation. Action orientation was measured using the Action Control Scale (ACS-90; Kuhl, 1994, see Study 1 for details). Reliability was adequate (Cronbach's $\alpha = .78$ for both AOF and AOD).

Procedure. The experiment took place in the classroom. Five groups, consisting of 13, 18, 23, 24, and 27 students, were tested. Subjects were told that the study was examining

individual differences in the preference for activities. They were asked to read the instructions carefully and respond spontaneously. Participants were then given all the materials and worked independently. Oral instructions were standardized and given by the same experimenter in all groups.

After the collection of general demographic data, baseline affective state and action orientation were measured by means of the PANAVA-KS and ACS-90, respectively. Next, affect was manipulated, using a story with either negative or neutral content. Subjects were told the task was about their ability to empathize with other people. They were instructed to "imagine the following situation" and to put themselves in the position of a person living with his or her family in the affected area. The subjects then read either the negative or the neutral story, depending on the experimental condition. After reading the story, subjects were asked to "write down from a first-person perspective what is on your mind and how you feel after hearing this news". This was followed by some empty lines.

Following affect induction, subjects responded to the PANAVA-KS once again, to measure change in affect. Next, subjects worked on two preference tasks: They rated the attractiveness of 12 vocation-related stimuli on a Likert scale ranging from 1 (*not attractive at all*) to 7 (*very attractive*). After that, they made complete pairwise preference comparisons of the same 12 stimuli, 66 in number. All preference items were presented in a predefined random order. Apart from affect induction, modality (pictures, words) of all stimuli and material (A, B) were manipulated between subjects. The two between-subjects factors were crossed, resulting in four versions of the questionnaire. In each group of subjects tested together, the four questionnaire versions were administered to a similar number of subjects.

After the preference measurement block, subjects were asked to write down the assumed purpose of the study and to indicate on scales ranging from 1 (*not at all*) to 7 (*very much*) to what extent a) they had tried to answer preference questions truthfully (truthfulness), b) they had answered preference questions at random (randomness), and c) the preference tasks were meaningful to them (meaningfulness).

Each data collection session lasted no more than 45 minutes. About ten minutes of each session were used for pre-instructions and debriefing. Subjects who had finished the

questionnaire before the end of the data collection period were told to raise their hand. They were given a filler text to read until the data collection period had elapsed. This was done to ensure that subjects who worked more slowly were not disturbed by other subjects leaving the room.

At the end of the data collection period, the experimenter thanked the subjects and informed them about the true purpose of the study and the main hypothesis. Subjects had the opportunity to ask questions and were asked to maintain silence about the details of the study.

Results

Manipulation check. Negative affect in the two experimental conditions did not differ at baseline, $t(100) = -0.41$, $p = .681$ (two-sided). However, following manipulation, negative affect was stronger in the negative affect condition ($M = 3.54$, $SD = 1.13$) than in the neutral affect condition ($M = 3.21$, $SD = 1.11$), $t(104) = 1.97$, $p = .026$ (one-sided). This difference remained after controlling for negative affect at baseline, $b = 0.19$, $SE = .081$, $t(100) = 2.34$, $p = .022$.

Self-access measures. Rating-choice consistency and the number of transitivity violations were calculated using the same procedure as in Study 2. Note that, while a set of nine items was used in Study 2, sets of 12 items were used in Study 3, possibly leading to larger ranges in outcome variables. Table 3 shows the means, standard deviations, and zero-order correlations of the main variables measured in Study 3.

Rating-choice consistency. One subject, whose rating-choice consistency was more than 7 standard deviations above the mean (i.e. who made 41 inconsistent decisions), was removed from the following analyses. The data of $n = 105$ subjects were included. In the resulting dataset, the number of inconsistent choices ranged from 0 to 14 ($M = 6.4$, $SD = 3.4$, $Mdn = 6$) and was only slightly skewed ($g_1 = 0.28$). Data were analysed using negative binomial regression.

In a first analysis, only control variables were entered. The number of inconsistent choices was regressed on the number of pairs with equal attractiveness, the mean as well as the standard deviation of the subject's ratings, material (A, B), truthfulness and randomness of

answers in the preference tasks, and meaningfulness of preference tasks. Using stepwise AIC selection, variables not contributing to the model were identified and excluded. The only variable tending to contribute to the model was truthfulness. Subjects who indicated that they had answered more truthfully tended to make fewer inconsistent decisions, $b = -.10$, $SE = 0.06$, $z = -1.66$, $p = .098$. Therefore, truthfulness was included in the following analysis.

A second negative binomial model was run to test the main hypotheses. AOF was standardized for the following analyses. The number of inconsistent choices was regressed on truthfulness, modality (pictures, words), the affect manipulation (negative, neutral), AOF, and the Affect Manipulation $\times$ AOF interaction. Stepwise AIC selection revealed that modality, $\chi^2(1) = 0.35$, $p = .553$, the interaction, $\chi^2(1) = .1.55$, $p = .213$, affect manipulation, $\chi^2(1) = 0.14$, $p = .711$, and AOF, $\chi^2(1) = 0.57$, $p = .452$, did not contribute to the model. The final model was identical to the final model of the first analysis, with only truthfulness remaining in the model (statistics see above).

The initial negative binomial model was superior to an otherwise equivalent Poisson model, according to a likelihood ratio test, $\chi^2(1) = 102.6$, $p < .001$.

Transitivity violations. The number of transitivity violations ranged from 0 to 30 ($M = 3.69$, $SD = 5.17$, $Mdn = 3$) and was positively skewed ($g_1 = 2.12$). For this outcome variable, 48.9% of data points were zeros. Of the 106 subjects, 14 (13.2%) were excluded because of missing data in the pairwise preference decisions. The data of 92 subjects were included. Data were analysed using zero-inflated negative binomial (ZINB) models.

In a first analysis, the effect of control variables was tested. The number of transitivity violations was regressed on the standard deviation as well as the mean of ratings, material (A, B), randomness, truthfulness, and meaningfulness. According to stepwise AIC selection, none of these variables contributed to the model, $\chi^2(2) < 3$, $p > .25$.

In a second ZINB model, the number of transitivity violations was regressed on modality, affect manipulation, AOF, and the Affect Manipulation $\times$ AOF interaction. Based on stepwise AIC selection, the interaction, $\chi^2(2) = 0.90$, $p = .637$, modality, $\chi^2(2) = 1.49$, $p = .475$, and AOF, $\chi^2(2) = 2.43$, $p = .297$, were removed from the model. Affect

manipulation emerged as the only significant predictor of the number of transitivity violations. Subjects in the neutral-affect group made more transitivity violations than subjects in the negative-affect group, $b = 0.39$, $SE = 0.19$, $z = 2.06$, $p = .039$.

The initial ZINB model was tested against a negative binomial model without zero inflation as well as against a zero-inflated Poisson model. The zero-inflated model was superior to a non-zero-inflated model according to the Vuong test for non-nested models, $Z = -4.49$, $p < .001$. The ZINB model was superior to the zero-inflated Poisson model, based on a likelihood ratio test, $\chi^2(1) = 35.71$, $p < .001$. Therefore, the ZINB model is considered the most appropriate of the candidate models.

Insert Table 3 about here

Discussion

In Study 3, the hypothesis that preference consistency may serve as a measure of self-access was tested in an experimental design. Again, rating-choice consistency and transitivity were used as alternative measures of consistency. Negative affect was successfully induced using a story reading and writing task.

Contrary to expectations, neither affect manipulation, nor AOF, nor their interaction predicted rating-choice consistency. The number of transitivity violations depended exclusively on affect manipulation, though in the opposite direction to that expected. Induction of negative affect appeared to reduce the number of transitivity violations. While the results of Study 2 partially supported the theory, these results were not replicated in Study 3 using an experimental design.

General Discussion

According to PSI theory, self-access is impaired in a state of negative affect, especially in low-AOF subjects who are less able to cope with negative affect than high-AOF subjects. In the three current studies, this hypothesis was tested using preference consistency as a self-access measure. Different measures of preference consistency—rating-choice consistency

and intransitivity—were used in correlational as well as experimental designs and with different types of materials (office- and work-related activities, animal photographs).

While most previous research has viewed preference consistency as a universal—or universally absent—feature of human decision-making (see Regenwetter et al., 2011), the current paper treats consistency as a variable that is influenced by situational and personality factors. So far, the idea that preference consistency varies within or between subjects has received little attention. Research by Lee et al. (2009) and Nordgren and Dijksterhuis (2009) has shown that a more spontaneous, compared with a more deliberative, response increases preference consistency. The current research goes beyond these studies in that it tests the combined effects of trait (i.e. AOF) and state (i.e. affect) variables on consistency measures.

In Study 2, subjects in a state of high negative affect or threat-related life stress made more inconsistent choices. This result is in line with the hypothesis that negative affect or stress interferes with self-access (Baumann & Kuhl, 2003; Kazén et al., 2003; Kuhl & Kazén, 1994). According to PSI theory (Kuhl, 2000), this interference is due to a predominant analytic cognitive mode when experiencing high negative affect, which hinders the retrieval of extension memory contents. Consequently, access to one's values, wishes, and goals is blocked.

The results of Study 2 suggest that preference consistency may indicate self-access and thus serve as a replacement for the self-infiltration (Kuhl & Kazén, 1994) and self-compatibility checking (Kazén et al., 2003) measures. These two measures, which are based on self-other distinction and self-access processing time, respectively, are far more time-consuming than the measurement of preference consistency. Replacing them by consistency measures may allow data to be obtained more economically in self-access research.

However, in none of the studies did negative affect interact with AOF in predicting self-access. Thus, AOF did not, as expected, buffer the debilitating effect of negative affect on self-access. This result has two possible implications. It may be thought to call into question the self-access hypothesis of PSI theory (Kuhl, 2000). However, as the self-infiltration effect has been replicated in several studies (Baumann & Kuhl, 2003; Kazén et al., 2003), this

possibility seems unlikely. Alternatively, it may call into question the use of consistency as a self-access measure. In other words, self-access processes may not be a major prerequisite for making consistent preference-based judgements and decisions. However, if consistency is not based on self-access, what else might it be based on?

There are at least two possible accounts of preference consistency without recourse to self-access: (1) preference consistency may be predominantly based on cognitive performance, not on self-access capabilities; or (2) the notion of dispositional preferences on which preference decisions are based may be called into question. Firstly, the preference tasks may be conceptualized as memory tasks, with consistency depending in part on memory performance. Given that people are motivated to appear consistent (Heider, 1946), subjects in the current studies may have been motivated to make binary decisions in accordance with previous attractiveness ratings. Subjects with a strong preference for consistency (Cialdini, Trost, & Newsom, 1995), who are furthermore capable of basing preference decisions on their memory of earlier preference decisions, may respond consistently, even if they lack any self-access capabilities.

Secondly, using preference consistency as a measure of self-access is based on the assumption that a subject is endowed with stable preferences that he or she may perceive or access more or less accurately. However, the perception of stable preferences is not the only process on which a subject's preference judgement or decision may be based. According to an alternative view, preferences are—at least in some cases—constructed just before they are reported (for a summary, see Lichtenstein & Slovic, 2006; Slovic, 1995). This view is based on findings that show that the preferences indicated by subjects vary depending on contextual factors such as the separate versus comparative presentation of options, or a forced-choice versus willingness-to-pay response format (cf. Shafir & LeBoeuf, 2004).

While the notion of preference construction predominates in decision theory, some researchers have argued that stable preferences nevertheless exist. Simonson (2008) took the position that preference construction processes as well as dispositional preferences—which he called *inherent preferences*—play a role in subjects' reported preferences and are by no means mutually exclusive. According to Simonson, peoples' inherent object preferences emerge

through experience with the object. When making decisions, however, people prefer to make relative, or comparative, judgements, in which context-dependent preference construction processes predominate.

With respect to the current studies, Simonson's (2008) account leads to two conclusions. In the first place, the assumption of a dispositional basis of preference decisions need not be wrong, as is suggested by a large body of BDT-related literature (see Lichtenstein & Slovic, 2006). In the second place, the lack of significant findings regarding the consistency measures used in the current studies may have been due to characteristics of the task which led to a relatively larger impact of preference construction processes, compared with processes related to accessing stable preferences. According to Simonson (2008), preference construction processes are favoured if easily comparable objects are used as stimuli, and if these stimuli are presented in a comparative manner, e.g. side by side. Therefore, the binary decisions used in the studies (or the one-out-of-six decisions in Study 1) should greatly foster comparative judgements and therefore preference construction processes. This may explain the lack of significant results regarding the transitivity measure.

Attractiveness ratings, in which items had to be evaluated one by one, should elicit absolute object evaluations and therefore be better suited to tapping into perceived stable preferences. This may be one reason why, in Study 2, rating-choice consistency, which involves attractiveness ratings, depended on negative affect, while this was not the case for consistency as measured by the transitivity measure, which is based entirely on object comparisons.

In Study 3, in which affect was manipulated, a significant influence of affect on transitivity was found, although this was not in the expected direction: Subjects experiencing negative affect made more transitive decisions than subjects in a state of neutral affect. If transitivity is interpreted as a measure of self-access, this result leads to the conclusion that negative affect may foster as well as hinder self-access, depending on circumstances.

The animal photographs used in Study 2 were presumably less self-relevant than the job-related activities used in Study 3. Moreover, the two studies featured different types and intensities of affect. While, in Study 2, mildly negative mood was measured, in Study 3, more

intense fear reactions were induced. Thus, based on the current results, self-access may be hindered particularly by mild negative affect in situations with low self-relevance.

While Kuhl (2001) does not consider intensity of affect to be relevant for the prediction of self-access, the *motivational dimensional model of affect* (Gable & Harmon-Jones, 2010) might explain why self-access depends on the intensity of negative affect. According to that model, affective states with a low motivational intensity (e.g. sadness, amusement) broaden attention, whereas affective states with a high motivational intensity (e.g. fear, desire) narrow attention. With respect to the two classes of processes in preference formation—preference construction versus access to inherent preferences (Simonson, 2008, see above)—, one might suspect that broad attention would facilitate context-dependent, comparative preference formation, while narrow attention would facilitate a more isolated, absolute evaluation of objects. Thus, the mild negative affect in Study 2 may have led to more comparative judgements and therefore fostered inconsistency, while the more intense negative affect in Study 3 may have led to more absolute evaluations of objects and therefore fostered the consistency of preferences.[5]

From the above considerations, it follows that the consistency measures used in the current studies differ fundamentally from the self-infiltration measures used in most studies on self-access in the context of PSI theory (e.g. Baumann & Kuhl, 2003). Consistency measures are indicators of contradictions within a number of measurements regarding the same objects. Thus, they are related to measures of congruence between implicit and explicit motives (Baumann, Kaschel, & Kuhl, 2005), or between implicit and explicit social cognitions (Nosek, Hawkins, & Frazier, 2011). These congruence measures concern the fit between different measurements of the same individual differences variables and are, thus, also measures of contradiction within the mental system. More generally, congruence measures may be identified with theories of personality integration.

In empirical existential psychology[6], personality integration is a process thought to foster well-being, health, and other positively assessed outcomes (Sheldon & Kasser, 1995; Weinstein, Przybylski, & Ryan, 2013; for reviews, see Weinstein, Deci, & Ryan, 2011; Ryan, 1995). Weinstein, Przybylski, and Ryan (2013) defined integration as the “relative coherence

and unity of experience underlying motivated action", which "varies both between and within individuals" (p. 69).[7] The preference consistency measures used in the current research indicate coherence within the mental system and therefore tap into an aspect of personality integration.

Self-infiltration, in contrast, is not concerned with internal contradiction but with the confusion between others and oneself. This notion is related to the construct of *ego boundary*, the feeling of "how far the ego extends, or more correctly, the point beyond which the ego does not extend" (Federn, 1952, as cited in Horner, 1973, p. 83). A number of psychological theories are concerned with the question of how well people are able to distinguish self from other. In developmental psychology, the ability of children, as well as monkeys, to recognize themselves has been studied by observing their reaction to their own mirror image (Dixon, 1957; Gallup, 1970). Adult human subjects have also been shown to confuse self with other in memory (Johnson & Raye, 1981), e.g. when generating ideas (inadvertent plagiarism; Brown & Murphy, 1989). Finally, research on close relationships has shown that people tend to include the close other in the self, i.e. to treat the "resources, perspectives, and identities of close others as their own" (Aron et al., 2004, p. 101). Thus, various psychological theories are concerned with the question of how well people distinguish between themselves and others, or how well they know the boundary of their ego. The self-infiltration measure is closely related to this class of theories, but largely unrelated to the personality integration theories discussed above.

Differences in results between preference consistency and self-infiltration measures may therefore be due to fact that the two measures belong to conceptually distinct classes of self-access measures. The results of the current studies suggest, as a whole, that self-other confusion measures are more suitable for tapping self-access than are preference consistency measures.

Implications for Future Research

Despite the lack of reliable convergence between self-infiltration and consistency measures of self-access, the latter may be an intriguing alternative to known self-access

measures. Further research should examine why the measures diverge, even though, in theory, they can be conclusively connected to self-access processes.

The current research was based on the assumption that, if preference consistency and self-infiltration converge, they should be predicted by the same variables, i.e. by action orientation and negative affect. This assumption is rather restrictive: Preference consistency was not assumed to be a measure of any kind of self-access, but of the kind of self-access defined in PSI theory research. Thus, preference consistency might be a self-access measure, but not be based on the same processes. If that were the case, preference consistency and self-infiltration—both being self-access measures in a broader sense—might still be directly related. Therefore, the direct relationship between consistency and self-infiltration measures should be determined in future studies.

This comparison should not only take place empirically, however, but also theoretically. In other words, the question should be addressed, how the concepts of self-access in terms of personality integration, on the one hand, and self-access in terms of ego boundary, on the other hand, are related. There are a number of plausible answers. Firstly, the two strands of self-access concepts may be distinct and uncorrelated, which could mean that a person with a more integrated personality is neither more nor less likely to confuse self with other. Secondly, they may be negatively correlated, which could mean, for example, that a person with a wider ego boundary is better able to integrate external demands into their self than a person with a more narrow ego boundary. Thirdly, they may depend on a common factor, which could mean that personality integration and the establishment of a clear-cut ego boundary go hand in hand. In short, the way in which the two concepts, and theories, are related is as yet unknown.

From a methodological point of view, the self-infiltration measure is relatively unaffected by interfering variables like task motivation and ability. This is achieved by advancing very specific hypotheses—i.e. by only taking false-self ascriptions of assigned activities into account—and by controlling for baseline memory performance (see Baumann & Kuhl, 2003). Preference consistency measures, in contrast, feature a number of effects that interfere with a potential self-access effect. Preference consistency may depend—apart from self-access—on memory-related cognitive abilities, preference for consistency,

context-invariance of judgements, and the care taken while working on the tasks. Future research should make an effort to separate self-access effects from cognitive and motivational effects in consistency measurements. The latter effects could be controlled for by measuring the respective variables, including the measurement of (e.g., memory) abilities in a context unrelated to preference decisions.

Conclusions

Previous research has suggested a number of self-access measures, including motive-goal congruence (Brunstein, 2010), self-concordance (Sheldon, 2002), and self-infiltration (Kuhl & Kazén, 1994). The prominent question in the current research was, whether measures of preference consistency might serve as an alternative measure of self-access. Only a small portion of the current data supports this view. Moreover, a number of processes have been identified that might superimpose self-access-related variance on preference consistency. The most prominent of these processes are comparative decision-making—which may be decoupled from inherent dispositions that might otherwise guide decision-making—and episodic memory processes.

On a conceptual level, it has become clear that different measures of self-access are based on distinct classes of theories—i.e. personality integration versus ego boundary—theories that are difficult to reconcile. While it has been shown that the—otherwise strictly cognitive—phenomenon of preference inconsistency is susceptible to the subject's affective state, the data cannot be comprehensively explained by current self-access theories.

Notes

[1]In the paradigm (Baumann & Kuhl, 2003), by design, the attractiveness of self-chosen and non-self-chosen items does not differ. Therefore attractiveness information is of little value for discriminating between self-chosen and non-self-chosen goals.

[2]All materials and instructions were in the German language. Instructions in this report are our literal translations, unless otherwise specified.

[3]The animals chosen were chameleon, common kingfisher, impala, frill-necked lizard, opossum, Atlantic puffin, batoidea, pterois, and one exemplar from the salamander group of animals.

[4]The sex and age of one subject are unknown, because he or she did not answer the respective questions.

[5]This interpretation stands in direct opposition to the predictions of PSI theory, according to which broad attention—in other words, holistic or intuitive processing—should lead to better self-access. However, the fact that preference consistency, used as an indicator of self-access, responds in an unexpected way to variations in intensity of affect may be entirely due to methodological factors, i.e. to the choice of consistency as the measurement method.

[6]For an overview of this field of research, see Greenberg, Koole, and Pyszczynski (2004).

[7]Weinstein, Przybylski, and Ryan (2013) define integration as unity of experience, i.e. of conscious processes. This restriction is arbitrary, however. Integration may also be defined to include unity of any processes underlying motivated action, be they conscious or unconscious.

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Table 1

Means, Standard Deviations, and Zero-Order Correlations of Measures in Study 1

Variable	*M*	*SD*	1	2	3	4
1. AOF	4.9	2.8				
2. AOD	6.9	2.9	.15			
3. Positive Affect	30.4	6.0	.07	.27*		
4. Negative Affect	13.4	4.6	−.23+	−.29*	−.24*	
5. Rating-Choice Inconsistency	12.9	4.6	−.04	−.04	−.09	.08

Note: $n = 73$.

$+p < .10$, $*p < .05$.

Table 2

Means, Standard Deviations, and Zero-Order Correlations of Measures in Study 2

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. AOF	4.8	2.8							
2. AOD	6.8	2.8	.33***						
3. Positive Affect	33.2	6.7	.33***	.28**					
4. Negative Affect	15.7	5.6	−.29**	−.24*	−.18+				
5. Demand-related Life Stress	8.0	2.6	−.20**	−.22*	−.35***	.46***			
6. Threat-related Life Stress	8.5	2.8	−.17+	−.23*	−.11	.41***	.74***		
7. Rating-Choice Inconsistency	2.9	2.6	.05	.01	.10	.20*	.05	.07	
8. Transitivity Violations	2.9	4.6	−.01	−.04	−.23*	.09	.16	.11	.26**

Note: $n = 105$.

$+p < .10$, $*p < .05$, $**p < .01$, $***p < .001$.

Table 3

Means, Standard Deviations, and Zero-Order Correlations of Measures in Study 3

Variable	*M*	*SD*	1	2	3	4	5	6
1. AOF	4.9	3.1						
2. AOD	5.0	3.2	.29**					
3. Negative Activation	3.3	1.1	−.31**	−.20*				
4. Positive Activation	4.0	1.0	.21*	.45***	−.47***			
5. Valence	4.9	1.2	.32***	.31**	−.68***	.53***		
6. Rating-Choice Inconsistency	6.8	4.8	−.03	.03	.03	.09	.04	
7. Transitivity Violations	3.7	5.2	.15	.13	−.06	.09	.07	.24*

Note: $N = 106$, *except for correlations involving transitivity violations:* $n = 92$.

$+p < .10$, $*p < .05$, $**p < .01$, $***p < .001$.

Discussion

In the present thesis, *self-access in goal selection* was defined as processes through which knowledge about the self becomes available for the selection of goals. In three papers, this construct was researched from a theoretical, a methodological, as well as an empirical perspective.

The theoretical perspective concerns questions regarding the definition of self-access as well as the similarities and differences between models of self-access. In Paper 1, a meta-theoretical framework was postulated that encompasses the least common denominator of theories of self-access in goal selection. According to the framework, self-access in goal selection may be conceptualized as communication between two systems, of which the first contains non-conscious self-representations and the second is responsible for the conscious processing of information. Communication—and thus self-access—is possible if the cognitive processes are available that are necessary for retrieving self-representations from memory. Such cognitive processes have been described as intuitive, experiential, or non-verbal.

Apart from similarities between models, differences were identified, which resulted in a classification of self-access models and measures. While some models explain self-access through intrapersonal processes, such as memory retrieval or self-perception, others focus on interpersonal processes, such as the resistance to external influences on one's own opinions and preferences. Therefore, self-access may not be a unitary construct but consist of at least two facets. The intrapersonal facet has traditionally been discussed in the psychology of motivation (e.g. McClelland, Koestner, & Weinberger, 1989), while the interpersonal facet has been discussed in empirical humanistic psychology (e.g. Kuhl, 2001; Sheldon, 2004).

The distinction between intra- and interpersonal aspects concerns self-access theory as well as methodology. From a methodological perspective, the self-access construct must be

further differentiated. This perspective concerns the question of how self-access in goal selection has been measured in previous research and how it should be measured to assure that the self-access construct is appropriately represented. In Paper 1, three classes of self-access measures were distinguished: subjective measures, fit measures, and process measures. Process measures were considered the most appropriate means of assessing self-access in a narrow sense, i.e. self-access as a process. Fit measures were considered appropriate for the assessment of self-knowledge in terms of a fit between the person's perceived and actual states and traits. Subjective measures were considered unsuited for the measurement of both self-access and self-knowledge. They may be useful to measure *perceived* self-access, which is, however, different from actual self-access.

In Papers 2 and 3, an empirical perspective was taken, which means that hypotheses derived from theory were tested. In Paper 2, a replication of the combined effect of action orientation and negative affect on the false self-ascription of assigned activities (i.e. on self-infiltration) was attempted (Baumann & Kuhl, 2003), an effect put forward by PSI theory (Kuhl, 2000). In Paper 3, the use of the consistency of preferences as a self-access measure was explored in three studies. In both papers, measures of self-access did not reliably and consistently depend on the predictors specified by PSI theory. While in the case of self-infiltration the effect's robustness must be called into question, in the case of preference consistency, the appropriateness of the procedure for measuring self-access, as defined in PSI theory, must be doubted.

Contrary to expectations, action-oriented subjects made more self-infiltration errors than state-oriented subjects in Paper 2. This result is not consistent with similar studies (Baumann & Kuhl, 2003; Kazén, Baumann, & Kuhl, 2003). However, previous research has shown that state-oriented subjects may display better self-regulation than action-oriented subjects when negative affect is low (e.g. Jostmann & Koole, 2006). Thus, the higher self-infiltration rates of action-oriented subjects may be due to the fact that negative affect was generally low in the present study. Still, because action-orientation has primarily been defined as the ability to regulate affect, it proves difficult to explain its undesirable effects on action regulation.

In Paper 3, preference consistency was in most cases not predicted by action-orientation or negative affect. Thus, preference consistency does not seem to depend on the same factors as self-infiltration. This unexpected result was explained based on the above-mentioned distinction between intrapersonal and interpersonal self-access processes: While the self-infiltration measure assumes interpersonal processes—i.e. coping with intentions assigned by others—merely intrapersonal processes are thought to underlie preference consistency. Thus, self-infiltration may be related to theories of ego boundary (Horner, 1973), which concern the ability to distinguish self from other, while preference consistency may be related to theories of personality integration (Sheldon & Kasser, 1995), which concern the contradictions among cognitions, emotions, and action tendencies within one mental system.

It does not follow from PSI theory that self-access needs to be restricted to interpersonal processes, such as coping with external assignments. Rather, according to the theory, self-access is defined as the successful retrieval of self-relevated information from memory, which refers to an entirely intrapersonal process. Thus, self-perception processes—which preference consistency measures aim at—should underlie self-access functionality in terms of PSI theory.

It is, however, possible that consistency measures do not tap into self-perception processes. Firstly, performance on consistency measures may depend, apart from self-perception, on the care taken while working on the preference tasks. For instance, superficial processing of items may result in low consistency scores that are, however, not based on a reduced ability of self-perception. Secondly, consistency measures that are based on comparative preferences—i.e. choices between two or more simultaneously presented objects—might increase the influence of the item context on decisions. Two or more simultaneously presented items constitute a unique context, which may reduce the influence of the subject's inherent preferences on the reported preferences (see Simonson, 2008).

Taken together, considerable convergence between self-access theories was found. However, contrary to expectations, no measure of self-access in goal selection—not even the well-established self-infiltration measure—was validated by the present research. The conceptual distinctions that resulted from the present research may be useful for making more

specific predictions about the differences between measures of self-access.

Limitations

The present research is limited in several respects. In particular, it did not consider all possibly relevant self-access phenomena, theories, or paradigms. Firstly, hypotheses in empirical studies of the present research were mostly based on PSI theory (Kuhl, 2000), not on other theories of self-access. It may be argued that PSI theory provides one of the most elaborated accounts of self-access in goal-selection. Unlike other self-access accounts, PSI theory features a process theory, as well as an objective measure of the phenomenon, which might justify its choice. Nevertheless, hypotheses and methodology of theories such as the information processing model of dual motivation (Schultheiss & Strasser, 2012) or the self-concordance model (Sheldon, 2002) might have been included in the empirical studies of the present research.

Secondly, areas of personality psychology that are closely related to self-access research have not been thoroughly discussed. Concepts like identity status (Kroger, Martinussen, & Marcia, 2010), indecisiveness (Germeijs & De Boeck, 2002), or self-concept clarity (Campbell, 1990) refer to individual difference variables that may be associated with self-access in goal selection. However, while these concepts may be theoretically relevant, research in these areas does not usually feature an analysis of antecedents and consequences of self-access.

Thirdly, in the present research, methodology from memory and decision-making research was adapted to the study of self-access. Thus, methods were used outside of the theoretical context from which they had originated. This transfer of methods between research domains resulted—to a certain extent—in a neglect of processes that are commonly identified with those methods. This issue—which might be called *methodological alienation*—concerns self-infiltration as well as preference consistency.

From the perspective of memory psychology, self-infiltration is a measure of source memory for the distiction between self and other following incidental learning. The present research, however, has considered the memory-psychological aspect only to a limited extent. Procedures were not designed for the rigorous testing of memory processes. Therefore,

conclusions about such processes should be treated with caution.

Similarly, preference consistency was used as a measure of self-access in the current research without fully considering theories from the decision-making domain that are usually applied to this type of measurement. Theories of multiattribute decision-making (Yoon & Hwang, 1995), for instance, are suitable for explaining differences in preference consistency regarding objects with multiple features. Disregarding decision-making theories may have led to explanations that are not compatible with previous research. The mixed results regarding the association between affect and self-access (Paper 3), for instance, may be explicable only when decision-making processes are taken into account.

Fourthly, in the present research, self-access in goal selection was discussed in terms of the availability of one's evaluation of actions or objects, i.e. of the value aspect of goal selection. However, goal selection is typically thought to depend on both expectancies (e.g. feasibility) and value (desirability; Gollwitzer & Oettingen, 2012). Therefore, self-access in goal selection may not be defined only with respect to the value aspect, but also with respect to the expectancy aspect.

The *theory of fantasy realization* (Oettingen, Pak, & Schnetter, 2001) may be interpreted as a theory of self-access in goal selection with respect to expectancies. According to the theory, expectancy information—i.e. the perceived difficulty of goal achievement—is taken into consideration only if the desired future and the present reality have been contrasted (see the introduction chapter of the present thesis). This varying availability of expectancy information in the goal-selection process may be regarded as an instance of self-access.

One might argue that a full account of self-access in goal selection should include the value as well as the expectancy aspect of goal selection. The present research, however, is limited to self-access with respect to goal desirability, i.e. the value aspect. This limitation is, in part, arbitrary. However, it is plausible that, in the process of goal selection, desirability is primary to feasibility. For instance, Achtziger and Gollwitzer (2008) held that goals originate from needs which, in turn, lead to the generation of wishes. Both needs and wishes concern the desirability component of goal selection. Thus, wishes are the impetus that leads to the

weighing of pros and cons in terms of both desirability and feasibility. It is unlikely that a person choses a goal solely on the basis of feasibility considerations, for instance, because the goal is easy to achieve, without any higher-level need or preference from which the goal is derived. From this point of view, desirability is primary to feasibility.[1]

Fifthly and finally, the attempt to corroborate self-access theory was limited by the fact that an economical and well-established method of measuring self-access is not available today. The picture story exercise (PSE; McClelland et al., 1989) is well-established in research but not suitable for diagnosing individuals because of the test's questionable reliability and because norms are not available. The self-infiltration paradigm (Kuhl & Kazén, 1994) has generated a considerable number of studies in the past decade. However, a central self-infiltration effect could not be replicated in the present research. This may either indicate that the effect waxes and wanes, depending on unknown circumstances, or that the complexity of the paradigm makes independent replications difficult. Because measurement of self-access is not a easy task, the present research was, in part, forced to be focused on methodological problems to the disadvantage—one might think—of theoretical progress.

Questions Not Answered—or Not Even Asked—by the Present Research

No research project provides answers to all questions related to its topic. In the following, three questions are asked that have not been answered by the papers of the present thesis but may stimulate future research. These questions refer to contradicting predictions by different strands of research, to the unambiguously positive evaluation of self-access by some researchers, and to the assumption of dual systems.

Can Contradicting Predictions Be Reconciled?

According to PSI theory, self-access is deficient in subjects experiencing negative affect, especially in state-oriented subjects (Baumann & Kuhl, 2003; Kazén et al., 2003). This assumption is challenged by contradicting predictions derived from other theories.

I have argued above that the theory of fantasy realization (Oettingen et al., 2001) may be considered a self-access approach because it explains the variation in the extent to which

expectancy information is considered during goal selection. In a series of experiments, Kappes, Oettingen, Mayer, and Maglio (2011) found that subjects in a sad mood, compared to subjects in a neutral mood, engaged more in mental contrasting and that, subsequently, their goal commitment was more in line with expectancy information. Thus, subjects in a sad mood appeared to display better self-access than subjects in a neutral mood.

Similarly, results from memory psychology contradict the assumption that a sad mood leads to a confusion between self and other. Hege and Dodson (2008) tested whether a specific kind of self-other confusion, *inadvertent plagiarism*, depends on affective state. Inadvertent plagiarism refers to the confusion of one's own ideas with ideas generated by others. Hege and Dodson hypothesized that subjects in a sad mood are less likely to display self-other confusions than subjects in a happy mood because they process items more locally. This hypothesis was confirmed in a series of studies. Therefore, if self-other distinction is taken to be the construct of interest, then the results by Hege and Dodson contradict self-infiltration research according to which negative affect increases self-other confusion.

From the above, two questions result: Is self-access fostered or hindered by negative affect? Is self-other distinction—a proposed proxy variable of self-access—fostered or hindered by negative affect? Reconciliation of the contradictive results might be possible in two ways: Either one of the contradicting theories is not tenable, or the constructs involved in the contradicting theories are not comparable. Further research should clarify the relationships, firstly, between the value and the expectation aspect of self-access and, secondly, between self-infiltration and other instances of self-other confusion.

Is Self-Knowledge Desirable?

While research results do not agree on the predictors of self-access or self-knowledge, most researchers share the opinion that self-knowledge is a desirable characteristic. Some psychologists from the humanistic or existential tradition hold strong beliefs about the characteristics of the ideal, or "fully functional" person (Rogers, 1961; cf. Sheldon, 2004). Self-knowledge is among those positively valued characteristics (Wicklund & Eckert, 1992). However, the question of whether self-knowledge is desirable under all circumstances is

debatable.

As Taylor and Brown (1988) pointed out, views about the benefits or costs of self-knowledge diverge. In clinical psychology, *contact with reality* is considered an important aspect of mental health. Research from social psychology, however, has shown that unrealistically positive views of the own person, illusions of control, or unrealisitic optimism have positive consequences for well-being and health (cf. Brown & Dutton, 1995). Thus, an unrealistic view of one's abilities and of one's future has, on the whole, positive consequences. People who slightly overestimate their abilities may set goals for themselves that are challenging, which might be beneficial for self-regulation (Locke & Latham, 2002).

Inaccurate self-knowledge in terms of optimism or self-enhancement is related to the expectancy aspect of goal striving. With respect to the value aspect, by contrast, the view that self-knowledge is beneficial (e.g. Brunstein, 2010; Sheldon, 2002) has not been challenged. Hence, one might conclude that accurate knowledge of one's needs and preferences is advantageous, while accurate knowledge of one's abilities and prospects—as opposed to their overestimation—is related to reduced well-being and health.

On the other hand, people who habitually choose tasks that are much too easy or too difficult for them—which might well be for lack of self-knowledge—should suffer from this mismatch. Because they can rarely be successful in a challenging task, their need to feel competent (Ryan & Deci, 2008) is likely to be thwarted .

How Many Systems?

Self-knowledge and self-access are commonly thought to be based on a distinction between two mental systems. In the dual-system communication framework (see Paper 1), self-access was defined as a transfer of information from one memory system holding unconscious self-representations to a second memory system holding conscious self-representations (e.g. goals). However, the idea that self-access is based on a duality of systems is challenged by at least two theoretical claims.

Firstly, Evans and Stanovich (2013), while opting in favour of dual-processing models, discourage the notion of two underlying systems. They argue that it cannot usually be assumed

that duality phenomena are based on exactly two systems. In fact, in the human brain, a large number of systems is involved in any complex mental function, including goal selection and decision-making. From this point of view, dual-system assumptions in self-access theories do not appear to be appropriate descriptions of the neurological basis of self-access. Rather, they must be taken to be metaphorical descriptions of theoretical claims.

Secondly, some researchers in the field of implicit social cognition have abandoned the notion that implicit and explicit cognition stem from distinct memory systems. Gawronski and Bodenhausen (2012) held that implicit and explicit measures of attitudes do not differ with respect to source but tap into different aspects of evaluative judgements. While explicit measures of attitudes refer to associations between the self and the liking of an object (e.g. between *self* and *liking swimming*), implicit measures of attitudes refer to associations between an object and its incentives (e.g. between *swimming* and *fun*; p. 5).

The same might apply to the distinction between implicit and explicit measures of motivation. In explicit measures of motivation—e.g. measures of goal commitment—the subject indicates to what extent his self and a possible action are compatible. In implicit measures of motivation—e.g. the picture story exercise—, by contrast, the self as a concept is not involved in the measurement process. Thus, implicit and explicit measures of motivation might not tap into distinct memory systems but into different aspects of motivation.

The Future of Self-Access Research

Research on self-access in goal selection operates in a niche. Because self-access theories are rooted in existential and humanistic psychology and not in empirical psychology, constructs related to such theories are difficult to define, measure, or manipulate. This is particularly true for variables that include an assumption of unconscious processing, such as self-access and self-knowledge.

Furthermore, research on self-access in goal selection is mostly unconnected to many areas of research that might be relevant to the topic, such as theories of self-access in decision-making (e.g. Lee, Amir, & Ariely, 2009), multiattribute decision-making (Wallenius et al., 2008), implicit attitudes (see Gawronski & Bodenhausen, 2012), dual-processing theories

(Evans & Stanovich, 2013), or models of consciousness (e.g. Baars, 2005).

The future of the psychology of self-access is a tightrope walk. Because empirical humanistic psychology differs from cognitive psychology with respect to the conception of man and to other fundamental assumptions, it has good reason to reject cognitive reductionism. While the relative isolation of this field of research may allow creative ideas to flourish, it may lead to a decoupling of self-access theory from state-of-the-art psychology. This dilemma has shaped the present research and, presumably, will shape the future of self-access research.

Notes

[1] This statement might be thought to contradict the risk-taking model of Atkinson (1957), according to which task attractiveness (i.e. desirability) is a positive linear function of task difficulty (i.e. the inversion of feasibility). In other words, the more difficult a task seems, the more attractive it is. However, the risk-taking model predicts choice only in terms of setting a level of aspiration, not in terms of deciding between different classes of incentives. For a choice of the latter kind, the desirability of attaining incentives from different classes matters. Thus, also according to this theory, the selection of a goal (in terms of *what* behaviour is chosen), which is based on the person's needs, depends primarily on considerations of desirability.

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